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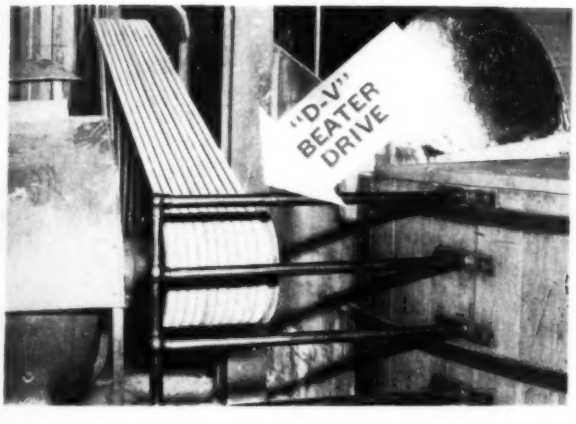
P1923

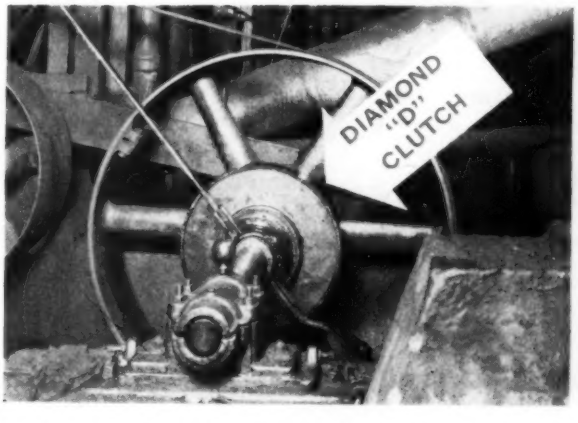
THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL SEPTEMBER 1933

U.S. Department of Agriculture

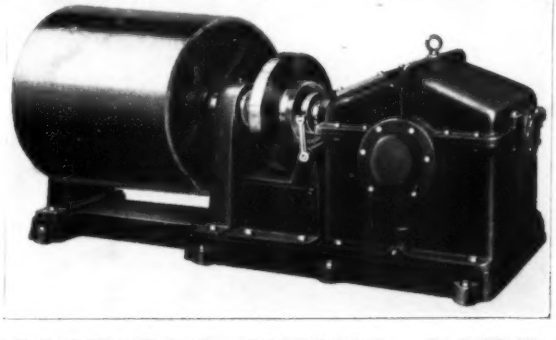
Now is the time to *Cut* your transmission *Costs*





Profitable production under "The Industrial Recovery Act" requires the elimination of every form of waste. Inefficient and obsolete drives rank high on the list of profit destroyers and should be immediately replaced by modern drives properly designed for the job and backed by power transmission engineering experience which will insure continuous troublefree operation.

Because the Dodge line includes all modern types of power transmission appliances, recommendations are made without prejudice as to type.



Dodge engineers are ready to help you select the right drive and lay out a program of power drive standardization. Many mills have profited by taking advantage of our service.

Power Transmission Engineers Since 1881

NRA MEMBER U.S. WE DO OUR PART

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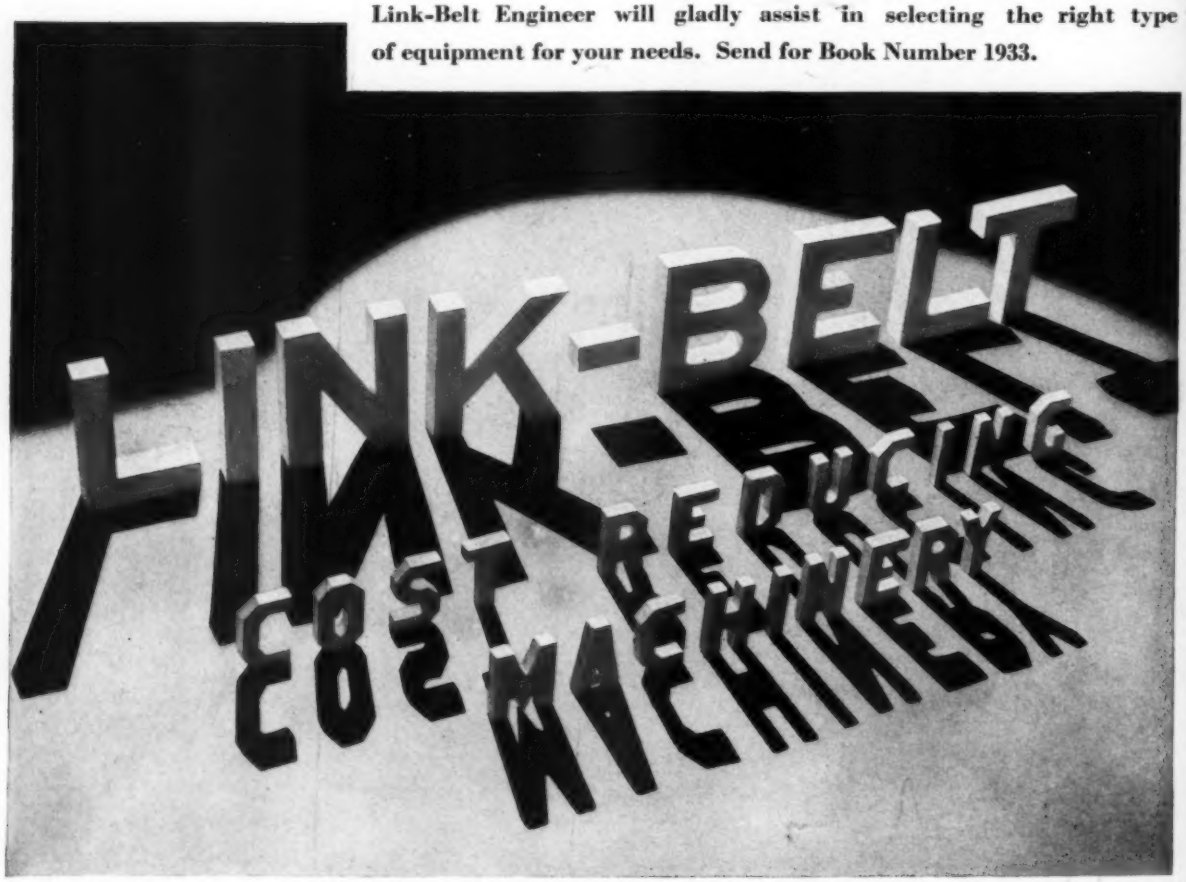
We must all operate efficiently to accomplish the three-fold objective of giving steady employment to more workers . . . . producing high-grade wares at low cost . . . . and earning a fair profit for the owners. Efficiency and low-cost production may be had by employing Link-Belt C-O-S-T R-E-D-U-C-I-N-G Machinery for handling materials mechanically and transmitting power positively . . . . A Link-Belt Engineer will gladly assist in selecting the right type of equipment for your needs. Send for Book Number 1933.



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This du Pont Dyestuff is also very suitable for permanent whites for soap wrappers and other papers where fastness to alkali is essential. Send for sample today. Test it in your own plant. You'll find it worth while adding to your list of du Pont colors. And remember—we are always ready to help you with any dyestuffs problem.

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THE PAPER INDUSTRY

SEPTEMBER, 1933
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Devoted to the Interests of the Pulp and Paper Industry

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NEWSPRINT, BOOK
AND KRAFT PAPER
WINDER. WIDTHS
180" to 262". ROLL
DIAMETERS UP TO 40"
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NEW FEATURE FOR REVERSING WEB IN WINDING
CAMERON PATENTED METHOD WINDS ROLLS WIRE SIDE OUT IF REQUIRED
CAMERON MACHINE COMPANY 61 POPLAR ST. BROOKLYN, N.Y.

ON MAGAZINE OR CATERPILLAR GRINDERS... AND POCKET TYPES, *too!*

CONTROLLING TEMPERATURE on a magazine type grinder. The Taylor System is considered today one of the most important recent developments in paper mill operation.

DOING A TOUGH JOB easily on a caterpillar type grinder. One of more than 50 Taylor Systems now saving money and helping to produce better pulp for U. S. and Canadian mills.

Taylor Control of Grinder Temperatures is a sure, money-saving investment. Mills say so themselves.

MORE than fifty Taylor Systems of Temperature Control on all types of grinders are operating in mills in the United States and Canada. This system was the first successful one of its type ever offered to the paper mill. It has proved its value many times over to mills using it.

Records made by Taylor Control say to you, "This is the easiest, surest way to obtain continuous, close temperature control, and thus to produce more and better pulp with less power at lowest cost."

Taylor Control eliminates hot and cold grinding. It increases stone life. It reduces stone cost per ton. It assures uniform texture, freeness, color and strength of stock.

Have you such precise, automatic control of grinder temperatures in your mill? No? Then you are losing money on lower quality stock and the profits you could gain on uniformly higher grade stock commanding the best prices.

We will give you, without obligation, complete data on this proved Taylor System for your mill. Write or wire Taylor Instrument Companies, Rochester, N. Y., U. S. A., or Taylor Instrument Companies of Canada, Ltd., Toronto, Canada.

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ADAPTABILITY

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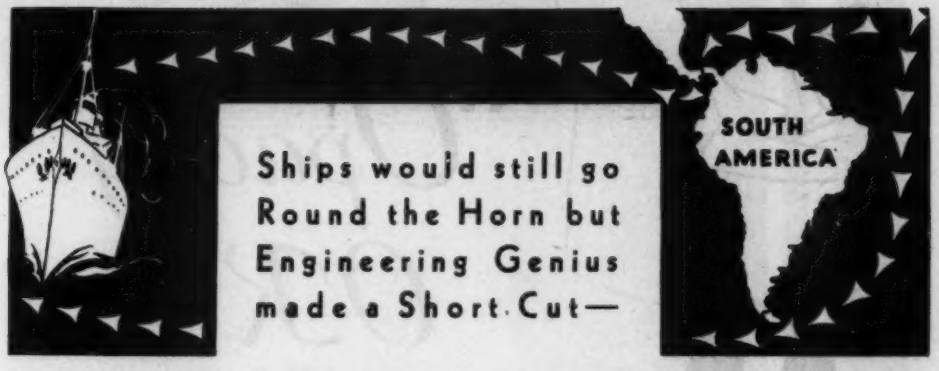
APPLETON WOOLEN MILLS
Appleton, Wisconsin

SHORT CUTS TO REDUCED COSTS



Many Jordans are built Today *BUT* The JONES JORDAN Affords the quickest way to *Reduce Costs*...

Jones Split Adjustable Shell Type JORDAN, showing top half of shell raised giving view of Bandless Plug.

Take for example the reduction of costs made possible by the split Adjustable Shell. This exclusive feature whereby adjustment is obtained by sliding the shell instead of the plug allows quick accessibility thus effecting important time, floor-space, labor and money-saving economies.

The perfect control of plug and shell through precision adjustment to thousandths of an inch and the elimination of all vibration through use of the non-adjustable plug result in a longer life of fillings and more efficient working of stock.

The simple design, sturdy precision-construction and advanced features of the Jones Jordan are real, outstanding engineering achievements that assure a short cut to efficient production at the lowest cost of operation.

Descriptive, illustrated bulletin mailed on request.

Jones

E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of High-Grade Machinery for Paper Mills

"Opacity OK"

KREBS PIGMENTS

for Paper Makers

TI-TONE P—This is an ideal, all-purpose, medium-priced pigment for increasing opacity. It consists of approximately 85 per cent Ponolith HO and 15 per cent Krebs Pure Titanium Dioxide.

PONOLITH HO—This pigment contains approximately 30 per cent zinc sulphide. It is low in cost and is recommended for use in the manufacture of paper where a high pigmentation is permissible.

KREBS PURE TITANIUM DIOXIDE—This pigment has a high index of refraction and is the strongest known pigment to impart whiteness and opaqueness to paper.

Paper manufacturers who use Krebs white pigments in the production of all grades of paper stocks know that the degree of opacity will be OK. An increasing number of production men are learning that opaqueness and whiteness of paper can be greatly increased with . . .

PONOLITH HO

This is a zinc sulphide pigment containing approximately 30 per cent zinc sulphide. Ponolith HO is a low-cost pigment which gives highly satisfactory results in the making of stocks in which a high pigmentation is permissible. It can be added directly to the beater, thereby incorporating the pigment in the paper. It can be used advantageously for making first-grade coated stocks. This pigment which is chemically pure, white and uniform, not only greatly increases opacity, but also brightens and whitens paper.

Krebs technicians will be glad to demonstrate to paper manufacturers how Ponolith HO and other Krebs white pigments can increase paper opacity. Complete information, samples and technical cooperation will be given upon request.

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THERE'S A KREBS PIGMENT FOR ALL TYPES OF PAPER

From out the Tests
at a Southern Laboratory
come these important Findings

"It was not until we got an 'Aloxite' Stone and put it into operation that definite progress was made in producing a uniformly satisfactory groundwood for newsprint from Southern pine."

THEY found that the Aloxite Brand Pulp Grinding Test Wheel produced pulps of practically identical quality by duplicating grinding conditions.

¶ Proof of the uniformity of the wheel structure—the uniformity of grinding action.

¶ They proved that this wheel held its distinctness of burr pattern for long periods—insuring continuous production of high quality pulp and that a change in grinding pressure as slight as two pounds per square inch, made pulp of measurably different physical characteristics.

¶ In other words, with the Aloxite Brand Pulp Grinding Wheel, two dominant factors were under definite control—the character of the wheel surface and the grinding pressure—two factors that have a lot to do with the production of uniformly high quality pulp.

¶ In laboratory test—in actual mill operation—the Aloxite Brand Pulp Grinding Wheel produces better pulp at lowered grinding costs.

ALOXITE BRAND PULP GRINDING WHEELS

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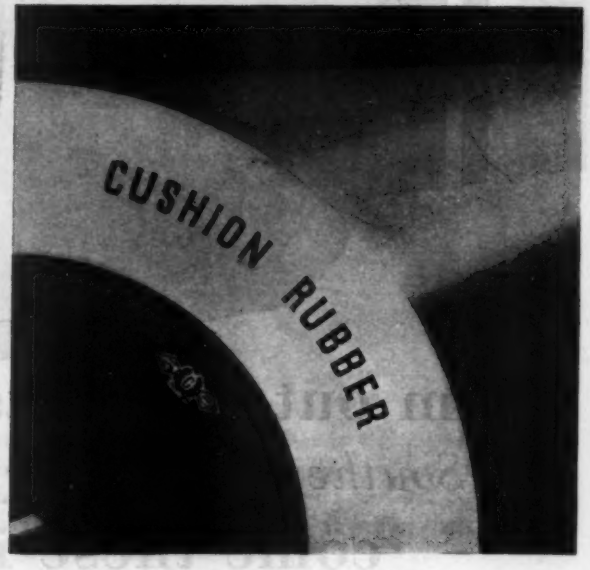
STOP SPENDING MONEY ... *on Dead Horses!*

Old Fashioned Hard-rubber Base Roll



Modern Goodrich Vulcalock Roll

BUYING rolls with a hard rubber base is like spending money on a dead horse. Because hard rubber is dead rubber, and represents just so much cushion waste. It is there only as a binder to hold the outer layer of cushion rubber to the metal core. At best it was a manufacturer's compromise—a relic of the days before Goodrich discovered Vulcalock, and found *a better way* to bond soft elastic rubber inseparably to metal.

When you specify Goodrich Vulcalock Rolls, you get what you pay for—100% live cushioning from outer surface to metal core, with 25% less cushion waste and up to 40% more cushion wear. But when you purchase other makes of rubber rolls, you have to put up with a hard rubber base—between cushion and core. That means less cushion; it means that you spend your money on dead rubber which has no cushioning properties—no longer serves a useful purpose.

With Goodrich Vulcalock Rolls, moreover, you don't have to re-cover so often. And when you do re-cover them, it isn't necessary to re-rough-thread your metal base, which wastes metal. It isn't necessary to machine your core thin and shorten its life; nor to pay for the added rubber required to build the roll up to the correct outside diameter. Vulcalock Rolls last longer, are less expensive to maintain; and yet the first cost is no higher.

Goodrich Rolls are made by the exclusive Vulcalock process—with soft rubber cushion clear to the core. Vulcalock Rolls do not have to depend on a dead, hard-rubber base. Specify Goodrich Vulcalock Rolls ... and stop spending money on dead rubber... The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

ROLL COVERINGS—BELTING—HOSE—MISCELLANEOUS RUBBER PRODUCTS

Goodrich

ALL *goodness* IN RUBBER

Vulcalock *Paper Mill Rolls*

Help N. R. A. Whip the Chiseller

THE battle for bigger and better business moves certainly and surely forward throughout the nation. Every hour of the day additional corporations and industries are enlisting in the N. R. A., and millions of consumers are signing up to do business only with those producers and manufacturers enlisted under the N. R. A. banner. Both are receiving their Blue Eagles, the insignia of the big battle.

When the enlistment of industries and consumers has been completed, what then? The training and disciplining of the whole body, the welding of it into one mighty, co-operative force for the great major offensive against depression — which is to be victorious!

Whether we believe it or not, this country is mobilizing for war—a war without quarter and to the death! Either we shall conquer depression or depression will conquer us.

Depression had driven this nation to the wall; it had us on the headlong run toward the abyss of bankruptcy. Then this present administration, under President Roosevelt's immediate and personal leadership, called a halt on the route, turned the tide of battle, dug into the Roosevelt resistance line, began the reforming of the shattered forces and called for a nation-wide mobilization of forces to fight the great fight.

It is the greatest, vastest warfare in history. The conception of the plan of campaign is nothing less than miraculous. It is the one, sole, active plan before the nation.

It can win! It *will* win!

It will save America! It *can* save the world!

Congress voted the depression an emergency. It gave President Roosevelt all the emergency power necessary to recruit, draft, and direct the huge industrial army. As Commander-in-Chief he is supreme.

Nothing but praise can be said of the leadership of the Commander-in-Chief. The manner in which he has received and administered his grant of high powers is beyond criticism. The patience, tolerance, indefatigable, ceaseless intelligent push which has characterized the operations of this administration so far calls for national commendation.

Of course, there are doubters, slackers, conscientious objectors, and even enemy aliens. We had them in the World War. We have them in this war. We always have had them. But at its heart's core the great rank and file of American industry is patriotically, profitably-minded and sound. It throbs its valiant response to the call for successful living, and manifests its co-operation by formulating its codes of fair industrial practice under which it foresees that industrial and individual profit and income shall be achieved.

There is no force to the objection that the outcome of this battle will mean federal supervision of business. It was the deliberate conclusion of the founders of the nation that only by the establishment of a centralized power in the country could life, liberty and the pursuit of happiness be secured, and so they created the Federal Government to supervise the national welfare. Government supervision of industry has come to stay.

We quote from a private, ex-party Washington News Service, wholly impartial and unbiased and free from all government influence. Last week they

had to say, "Private industry has demonstrated that it cannot govern itself in the public interest without some kind of direction, regulation or supervision from above * * * Government, therefore, must supply the control."

Who other than the Federal Government should take the initiative and leadership, and map out the campaign, direct and supervise the operations in the warfare against depression? Only the federal power can do this. Only federal leadership and authority can command the respect and furnish the power to make the supervision effective.

The chiselling enemy of profitable industry is about to meet his permanent conquerer.

Some Effects of Color

THE earth radiates beautiful color. The Master Painter has given his pupils a perfect and eternal color chart which glows and blooms with each succeeding season.

The eloquence of poetry, expressed or unexpressed, has found its perfection in: a blue sky tinted with the glow of a sunset; silver rays of moonlight on the water; green mounds of swaying trees melting into velvety lawns; gardens filled with crimson roses and flowers reflecting the soft tints of the rainbow; the rich, brilliant hues of autumn leaves; even the sparkling irridescence of pearl mirrored on soft snowdrifts by a winter sun.

Progress has developed in man the ability to reproduce the colors of nature, and has given him the vision to use them to brighten his surroundings.

The brilliantly colored buildings at "A Century of Progress" have been a delight to the millions of people that have thronged this land of pageantry since its gates were opened. There is enchantment in its splendor by day and magic in its gorgeous illumination at night. The effect is amazing. Youth forgets its weariness; age no longer remembers years; and the infirm responds to the glow of all this beauty with a quick, firm step.

The efficacy of paint as a preservative is universal knowledge, and the painting of mill equipment and machinery to forestall deterioration should always be emphasized. But the psychological effect of color is often overlooked. Here and there, however, are industrial executives who recognize the value of beautiful and colorful surroundings to cheer tired workers and to brighten drab days. They have also learned to establish warnings in hazardous places by the use of unusual color effects.

In its recent "Save the Surface" campaign, the American Paint and Varnish Manufacturers Association quotes Sidney L. Willson, president of the American Paper and Pulp Association, as saying: "Persons working in slovenly surroundings frequently acquire the nature of these surroundings, and unconsciously turn out slovenly work. In the manufacture of a quality product, it is necessary to have the workman 'quality conscious.' And there is no better way of instilling this consciousness into workmen than by keeping their working quarters bright, clean and well painted."

Another quotation was from Dr. Julius Klein, former Assistant Secretary of Commerce. He cited the instance of a company that in order to keep its workers on the payroll painted machines and equipment in gay, bright and—where machinery was concerned—contrasting colors. Employees took pride in voluntarily keeping clean the machines, floors and surroundings. Their morale was improved resulting in a better attitude toward work, in keeping with the general brightness and cheer of surroundings.

The present is a propitious time to give paper mills a new dress. And instead of re-painting the original color scheme, why not work out a new, more colorful combination, perhaps along modernistic trends. The finished appearance will enhance the value of a plant far beyond the actual cost of materials and labor.

Is Your Summer Work Done?

THE passing of Labor Day prompts one to recall that cold weather for many of the pulp and paper mills of the country is only a few short weeks away.

Perhaps during the cold winter months of last year or during the break-up period of spring, plans were made for work to be done during the summer months. Maybe the experience of last winter emphasized the need for a new and properly insulated roof over one of the machine rooms, or trouble in the wood room reasserted the necessity of improving facilities for storing and handling the wood supply during cold weather.

It is possible that some of the underground water mains may have showed signs of weakness, or some other condition was noticed and jotted down on your memorandum pad to be remedied or improved when the weather was more suitable for such work.

It might have been some exterior painting work that you wished to have done, or windows repaired, or doors fixed. How many such jobs did you have in mind to schedule for attention during the summer season? Are all of those jobs done?

Look into the matter of these minor and yet very essential jobs before it is too late to tackle them comfortably and economically.

Hamilton Felts

"IT doesn't mark the paper — that's the biggest thing I like about the Hamilton Felt. And because the weave doesn't show, you can use a Hamilton Felt until it's worn out completely. This isn't true of some of the other felts we've used."

Yes! — seventy-five years of experience do make a difference — a whale of a difference. Try a Hamilton Felt.

SHULER & BENNINGHOFEN, Hamilton, Ohio

Miami Woolen Mills, Established 1858

As Far as I Can See

By WILLIAM SIBLEY

IN THESE days of kaleidoscopic change, it is difficult for anyone to foresee coming events and almost premeditated suicide to hazard a prophecy. In six months, the new administration has so confounded the Government with industry and labor that there is no longer any line of demarcation. Nowadays, labor is Government, capital is Government, and politics is Government; and, inversely, Government is all three. Today the United States Government is in business to a far greater degree than ever before in all history; it is manufacturing or selling everything from electric power or fertilizer to golf balls or milk bottles. More than that, it has assumed the place as arbiter in all major industrial disputes. This is a far cry from the campaign slogans of 1924: "More business in Government, and less government in Business." And that was less than ten years ago.

Expressing a doubt regarding governmental practices at this time is like cautioning honeymooners against the possibility of marital strife. To suggest that we are heading for economic disaster now is like making a bid for popularity in a hospital by telling the patients that their respective physicians don't know their business. There is never applause for the man who bucks the stream, yet, as I have stated in these columns in the past, I will say again that so far as I can see, many of the radical measures recently put in force by the Government are doomed to failure. These measures are not experiments. There is nothing new about currency manipulation, crop reduction, industrial codes, or government subsidies. Similar experiments have repeatedly been tried and found wanting—as far back as the days of Confucius.

There is nothing wrong in putting into practice that which is old. Our constitution was founded on principles expressed by such antiques as Plato, Socrates, and others. The fact that something is old frequently testifies to its worth. But not when it is poc-marked with failure wherever and whenever operation has been attempted.

So far as I can see (which I freely admit has never been very far) the N. R. A. puts the Government in the position of attempting industrial control. And that has never been done successfully, even by England, who tried it as late as 1920. But the institution of such an act gives vastly increased power, if only by inference, to organized labor, and that inevitably leads to trouble. The year 1934 will undoubtedly be a year of strikes. Labor is going to try to exercise its new-found power. Capital is going to realize that under such an exercise it cannot exist. And trouble will follow, with the Government obligated with the role of arbiter.

But there is one thing about the N. R. A. which must be considered by all. Regardless of our personal conviction, it has the backing of poular opinion. Whether or not we as individuals believe it will work, weal or woe is beside the point at this late date. It is here, and it is going to be attempted. And after all, perhaps the sheer weight of universality will make it the exception and succeed. At any rate, the time is past for reasoning why. The time is here "to do or die." Already the A. P. & P. A. has entered its code, and formulated many of its necessary revisions. Several of the industry's divisions have submitted their individual subordinate codes and these are now in process of acceptance or revision. If there remain any divisions that have not yet submitted their divisional subordinate codes, the thing to do is to get them in as speedily as possible—then abide strictly by the agreements formulated.

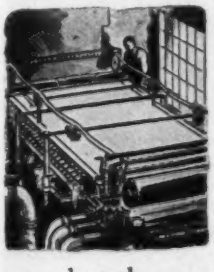
If, as some few members of our industry seem to think, the N. R. A. is going to take us to hell in a hand-basket, then for goodness' sake, let's go there, gain the experience and get out. There is nothing to be gained by prolonging the journey by bickering or destructive hesitancy. Personally, I am not in accord with some of the measures now being instituted in Washington. But "right or wrong, it's my country," and not only myself but I believe every right thinking American is going to help man the oars; then, if the ship sinks, swim as fast as we can to the floating dry-dock in an effort to lift her into place again.

There is too much hesitancy and self-promotion in this country. From March 15 to about August 1, the New York Times composite business chart showed the volume of business to be steadily gaining. The advance there portrayed was sharp and steady. Since August 1, a serious decline in that chart has been revealed, with the result that the loss of the past few weeks has swept away the gains of several previous months. Nor does this chart reflect such unstable things as the stock or grain exchange. It has to do only with Business with a capital "B"—car-loadings, unfilled steel orders, cotton forwardings, etc. That recent recession can largely be laid at the door of the unbelievers. Lacking conviction they lack energy, and without energy they get nowhere. Getting nowhere, they become a dead weight pulling down the ones who wish to advance.

This is no time for partisan politics. This is no time to cling to obstructing convictions. Right or wrong, let's make this country ***our*** country.

Here's one that's ENGINEERED

LOOK AT THE DIFFERENCE!



Many shower pipes are built — a Rainstorm is engineered. Look at the difference!

Maximum scouring action is obtained with lower pressures . . . less water is used . . . less power is consumed at the pumps . . . all dirt is kept off the screens or felts.

Here is how it's done.

In a Rainstorm, two small water streams are made to impinge at a predetermined angle —the resultant is a flat spray with nearly 50% increased velocity at no increase in initial water pressure.

During cleaning, all dirt is loosened from the inside by scrapers—a valve is opened in the end of a Rainstorm, and the rush of water carries all dirt out and away from the screen or felts—accomplished without removing the pipe or changing its position.

Have the facts. Send for bulletin . . . no obligation.

The SMITH & WINCHESTER MFG. CO.
South Windham, Connecticut

Send, without obligation, your bulletin covering the latest facts about Rainstorm Shower Pipes.

Name.....

Firm.....

Street.....

City..... *State*.....

★

The SMITH & WINCHESTER

Manufacturing 1828 *Company*

PLANT AND OFFICES AT SOUTH WINDHAM, CONNECTICUT

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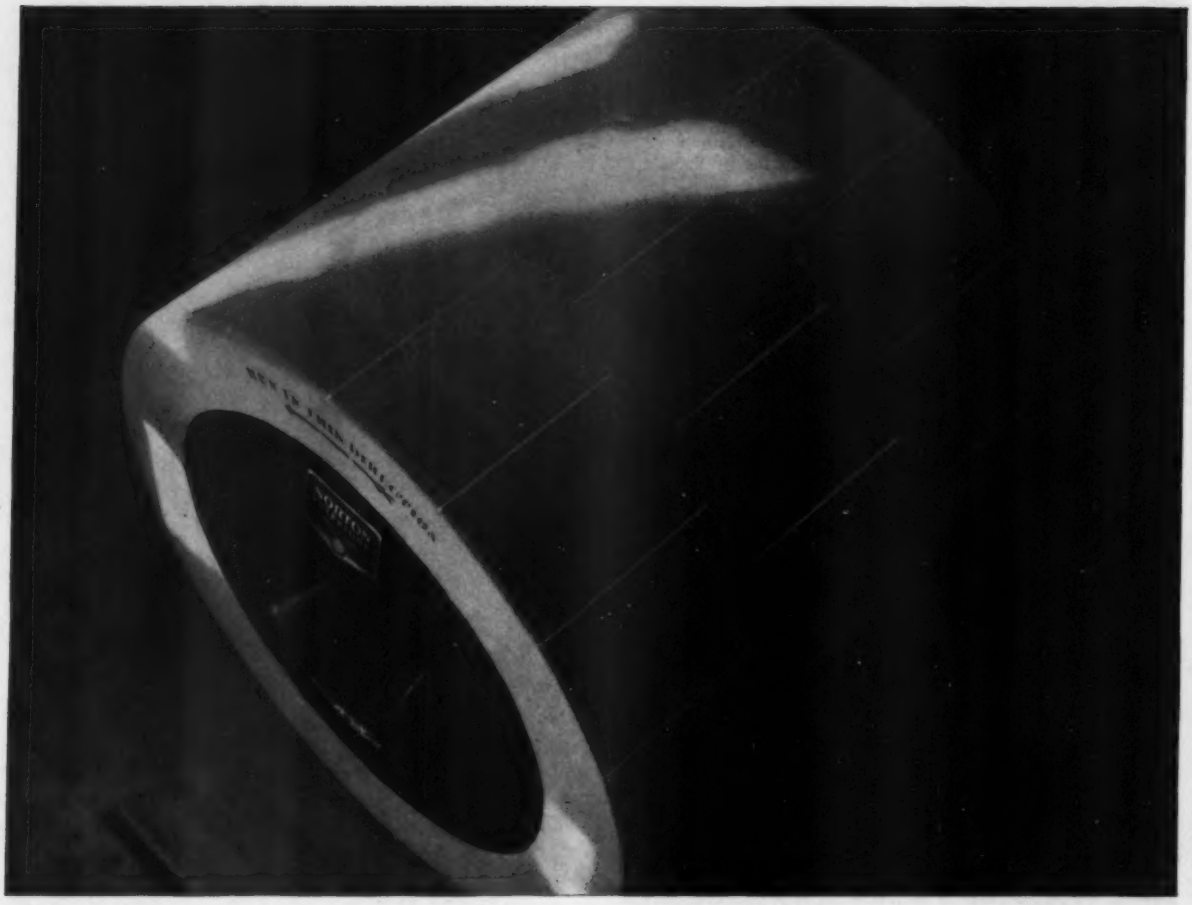

CUSTOM MADE STONE

◆ Pulp mills today have the advantage of flexibility in pulpstones.

◆ Each Norton pulpstone is a custom made stone—to meet the customer's requirements. The Norton Laboratories study the pulp stock, the length of fibers, thinness of fibers and all other factors that must be taken into consideration.

◆ The requirements of the mill producing board and the mill producing book papers are not the same. There is good reason for the Norton Laboratories' research work in connection with each order.

◆ One mill desires a stone that will produce stock with abnormally high freeness. Another mill aims to produce thin, short fibers—slow pulp. Then again power may be an important consideration—low horsepower per ton and high production with good quality.

◆ Stone structure controls paper quality.

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Worcester, Mass.

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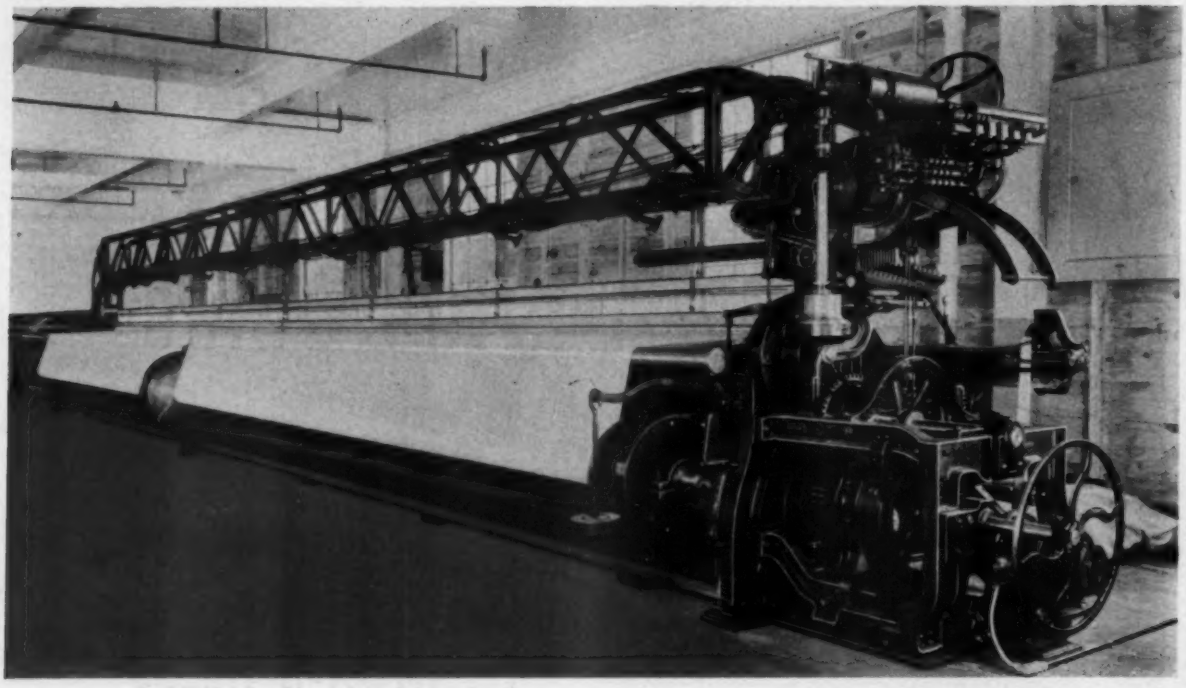

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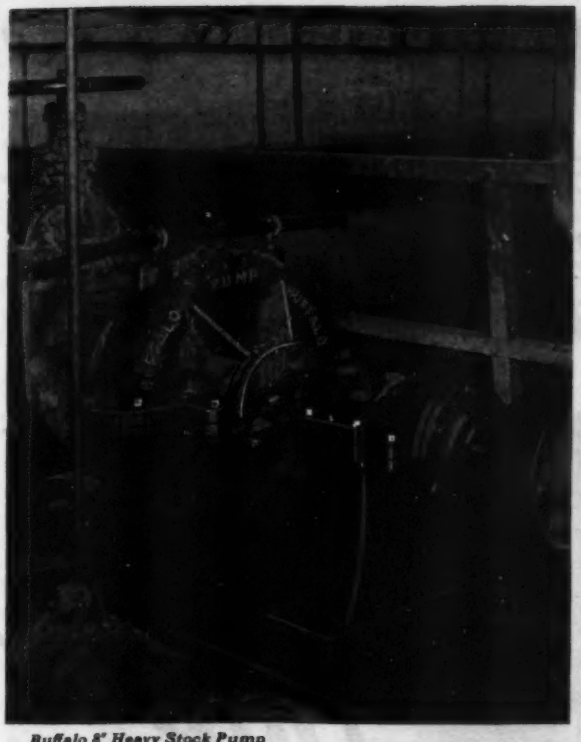

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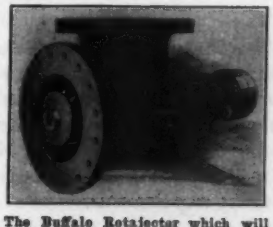

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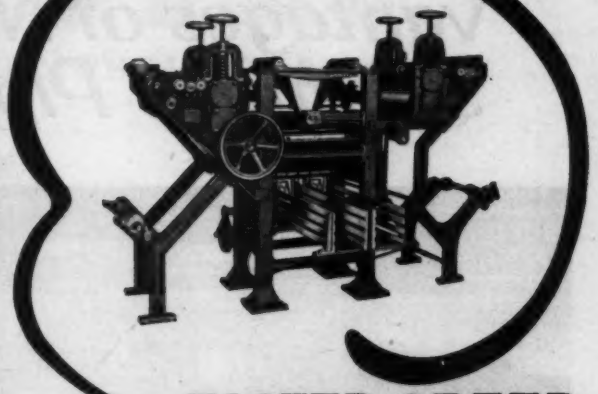

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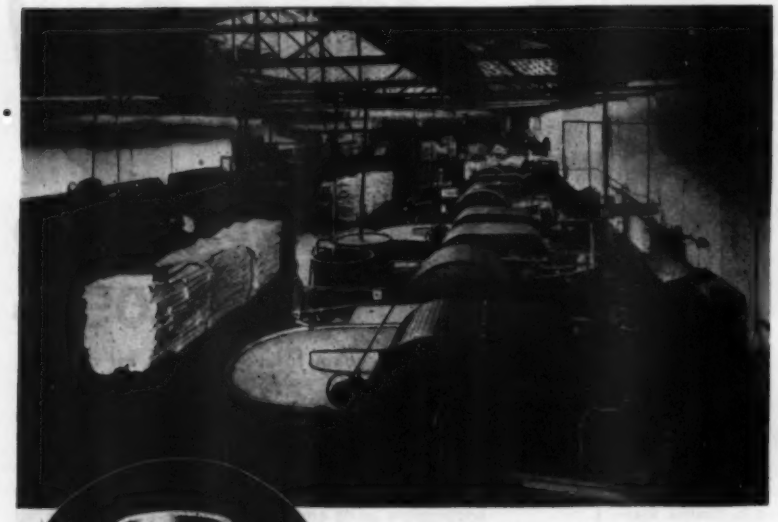
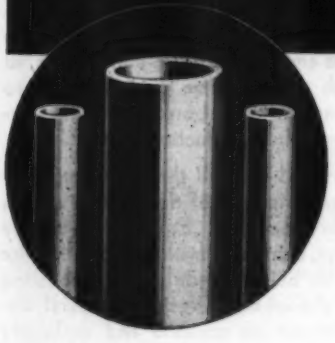


Pulp and Paper Manufacture



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THE PAPER INDUSTRY

A MONTHLY EDUCATIONAL JOURNAL

Technical Control in a Tissue Mill

By H. H. HARRISON
The Crystal Tissue Company

TECHNICAL control is only another name for the applied common sense always used in good papermaking. Today we may have more refined instruments to aid us but the principles are the same as they always have been. As the units in which paper was made became larger and larger technical control as we know it today became absolutely essential. Its fundamental object was to improve the financial earnings of the manufacturer. Its ideal was to produce the highest quality paper at the lowest possible cost. A language accurately understood by everyone had to be developed, and technical control was the result.

Events of the past few years have further emphasized the value of technical control. Six-hour tours, inexperienced help, re-use of long idle machinery, unfamiliar orders, etc., have made the men in the mills appreciate any system that would give them help. Through such control the specifications which the salesmen received from the customer finally reached the one man in the organization who should have them—the one who actually made the paper.

Technical control applies both to the chemical and to the mechanical processes. It is carried on in the office, the laboratory, and the mill. It is a part of the duties of several departments. The electricians have their motor readings; the power department has coal and steam figures; the cost department and the chemical laboratory contribute their share. Then if the papermaker does not use the information gathered to aid him neither technical control department nor papermaker last long in that mill. Where it has been used sensibly and economically—for there is some information which is not worth the cost of collection—a number of results have been generally evident:

(1) The quality of the paper has been improved which resulted in diminished sales resistance, selling expense, and allowances for rejected paper.

(2) Waste has been decreased. It is much easier to save a dollar than it is to earn another dollar.

(3) There has been a tendency to try to get full value out of the materials used. This applies not only to original purchases like pulp but to later operations. Care must be taken along this line lest in saving a nickel a dime is lost. This problem must be viewed from all angles.

(4) Higher efficiency has been secured on the paper machines. The highest speed is not always the most profitable. A most economic speed for various grades can be found. Sometimes a comparatively inexpensive piece of equipment is slowing down the production of the whole unit.

(5) Lost time on the machines has been reduced by periodic inspections by the millwright together with a follow-up file showing when clothing was put on the machine, rolls ground, or a Jordan chipped and when they are likely to again need attention. A logical arrangement of colored orders will also save time in wash-ups. Accidents frequently happen when the machine is starting after a wash-up. Avoid the wash-up and you reduce other troubles.

The responsibility for the quality of the paper must always rest with machine tender. He is the only one who actually sees all the paper and knows what goes into the jumbo rolls. Technical control tells him what tests he must make if he would avoid complaints of customers; then check him from time to time while the paper is being made, and tests samples from the finished roll. Blame rests as much on the inspectors as on the machine tender if they knowingly permit paper to be shipped which is not up to the standards experience has proven to be necessary.

There are some functions of such a department in a tissue mill which are like those in a similar department in any other mill. A catalogue of competitors' samples should be kept. It is very useful in making comparisons as to quality.

Members of the sales department are always asking

the ream weight or fiber analysis of small samples. They also make much of offering free service to customers and they ask for help in sales engineering, or ask for missionary work, as well as inspecting defective paper and settling complaints.

The purchasing department also gets some help so that the influence of the control department extends beyond the organization itself.

As the technical department frequently carries on whatever research or development work is done, it must always be on the alert for new things. There are generally rather definite indications along what lines research should proceed. The sales department is a fertile source of help in this for there is little use in developing an article which will not be marketable. This is difficult to determine. Some items which were thought to have excellent possibilities have been total failures and others which had known defects have blossomed unexpectedly into profits. Other items have increased in volume slowly by virtue of hard work on the part of the sales department.

One of the first steps in technical control should be the development of standards for the various grades of paper manufactured. These take the form of physical tests. As the instruments with which these tests are made can be wrong, the responsibility for checking them and insuring their accuracy is generally placed on the technical control department. Nothing injures the prestige of standard tests more than suddenly finding that some of the instruments do not read correctly. Perhaps even some good paper has been condemned and sent back to the beater room because an instrument needed attention.

Some Duties of the Technical Department

It is often the duty of the technical men to plan, record and interpret mill trials so that the results will be of direct practical value to the operating department, the cost department and the sales. From the data thus collected, they must work out the equipment changes which may be necessary.

Technical departments in all industries have a certain amount of trouble shooting. To approach this with a thorough knowledge of how things are when everything is functioning perfectly is more than half the battle. It is a case of applying the stethoscope and recognizing any abnormal sounds.

It should be the duty of someone to keep a record of the equipment: when it was purchased, where it has been used, repair parts purchased, and what parts may be on hand. Such a file will pay for itself by shutdowns eliminated and by the more efficient use of the machinery already owned by the company.

Not only should the men in the technical department know thoroughly the equipment and processes in their own mill but they should also keep informed of the new machines and processes in other mills. They should call attention to such new developments as appear to have an application in their own mill. They should study the whitewater wastes and the proper treatment of the fresh water used. They should also see that the information turned into the cost department is technically accurate, for correct costs can only be obtained when correct information is available.

One of the most important duties is to keep a file of samples of orders made. These formulae should be written directly on the paper sample. Then there is no question in the future of which formula belongs to a certain sample. Using these formulae and samples as a guide, the new formulae are made up from day to day. These new formulae should be inspected and approved by the superintendent before they are delivered to the machine. He is familiar with the condition of the machine and has warning of any change which will have to be made. The final responsibility for the furnish should rest upon the superintendent. It is the responsibility of the technical department to inform him of such matters as the availability of different pulps, their relative prices, past experience in making the order, and complaints or cautions received regarding the order.

In the above, technical control in a tissue mill is similar to that in any other mill. One of the greatest differences lies in the fact that tissue mills as a rule are comparatively small. They do not feel that they can carry the overhead of a large department exclusively devoted to this work. Force of circumstances, therefore, has made it necessary to teach present employees, machine tenders, foremen, beatermen etc. to make their own tests. This has some advantages. Most men want to make satisfactory paper. If they know what the various tests should be they will work to get them. Since they make the tests themselves they have no resentment from being told. The argument for such control tests being performed by specially trained people under a separate department is that the operators are able to give their undivided attention to production and maintenance of equipment. Which method is best depends on the size of the mill, the speed of the machines and the type of men operating.

Tissue paper has been defined as a class of papers made in weights lighter than 10 to 12 pounds per ream of 24 in. x 36 in.-480 sheets. In actual practice, this definition is generally expanded to include weights up to about seventeen pounds.

Each Variety of Tissue Demands Strict Technical Supervision

There are about one hundred and forty mills in the United States making tissue paper of some kind. The variety of papers classed as tissue is a surprise to anyone who has not given the matter careful thought. The qualities required in these different grades are as varied as it is possible to imagine.

Toilet tissue is by far the largest in tonnage. Absorbency, softness, and bulk are the requirements. Absorbency is necessary to sell the managers of large buildings who have a constant fear of large plumbing bills. Softness is required to meet the demand advertising has created. Bulk gives a big nickel's worth and fills the cabinets and the cartons in which it is sold.

Fruit wrap is next in tonnage. The standard tests for this paper are established by a Department of Commerce Standard which covers both dry and oiled fruit wraps. The commercial standard ream weight for the dry grade is 12 lb.

White wrapping is one of the best known tissue grades. Most of that on the market is made to a basis 24 in. x 36 in.-480 ten pounds. The commercial size

which appears on the market however is 20 in. x 30 in.-480 in most cases. This finds use largely in department stores, gift shops, floral shops, shoe factories, and in homes at Christmas time. As this paper is sold by the ream, it is very important that the ream weight of the paper be watched constantly or substantial losses may occur before anyone realizes it. Color, formation, and Mullen are the important qualities. This grade of paper has suffered during the past few years because one phenomenon of the reduced buying power throughout the world has been the tendency for consumers to demand cheaper grades, but having the appearance of the better grades of merchandise. This has naturally reacted unfavorably on the producers of No. 1 White Wrapping, who have had to change to the production of lower quality goods.

This lower quality wrapping tissue has appeared in two forms. One is an all sulphite sheet, unbleached, hard and strong. The other is loaded with groundwood or maybe old papers and is run very fast on the paper machine with little regard for strength. It is cheap paper made to sell cheap.

There is a type of tissue known as manila. Generally such papers are Sulphite and groundwood furnishes. They are used for cap stuffing, interlining linoleum, stuffing garments in window displays, etc. The ream weight must be watched carefully.

Colored wrapping tissue is largely a Christmas item. Red and green are used extensively. Twelve-pound red and green are used for Christmas bells and wreaths. Black tissue has a year round market for wrapping black suede shoes as white paper lints off on the shoe. The paper must be anti-tarnish so that it will not tarnish the metal trimmings of the shoes. Orange tissue finds extensive use at Hallowe'en. There are great economies possible in dyeing colored papers. A wise choice of dyestuffs, accurate matching in the beater checked by hand samples, a logical sequence of colors run on the paper machine and a careful matching against several previous runs are the essential points. If the order is a special shade, it is best not to start until an adequate sample is obtained. Samples will get dirty while being matched and a sample the size of a postage stamp is not fair to the papermaker.

Several varieties of tissue are called anti-tarnish. Considerable kraft tissue, some of it containing groundwood, is sold for wrapping automobile reflectors, scientific instruments, hardware, band instruments, etc. It is not claimed for this tissue that it will remove tarnish which has already started. It therefore becomes most essential that care be taken before the article is wrapped. We know of one case where the damage was caused by the perspiring hands of the operators. When they wore white cotton gloves the tarnishing and the complaints stopped.

The white anti-tarnish papers are used by jewelers, silversmiths, and optical companies. Great care is taken to remove all chemical residues by thorough washing. A few grades are made from rag stock, but most of them have a bleached sulphite base. This paper must be well closed and free from sulphur residues. In case of complaint this is the first thing tested for.

Quite a little tissue is made for the glass industry. This is dyed different colors for different sets. Certain chemicals in the paper are believed to be responsible for a cloudiness which sometimes appears in glass.

Carpet tissue is made in two tissue weights—11 lb. and 16 lb. The jumbo rolls are slit to rolls from ¾ to 1¼ inches wide, which are twisted into threads. These are made into a cop which goes into the shuttle of the loom making fiber rugs, upholstery, and seat covers. The dyeing of these papers should be fast-to-light, uniform and accurate. The tensile strength is very important and the paper should not be too hard and stiff.

Pleating tissue is special paper made for dress manufacturers and dry cleaners. The paper may be créped or uncréped. It is used on machines to hold the pleats in fabrics until the machine-made pleats can be permanently set by heat. Care must be taken that this is rough and well sized. The paper must be free from anything which might affect the dyes in the dress fabrics.

Napkins may be créped on the paper machine or by a second process. The raw material for embossed napkins is a créped sheet. Ornamental effects may be secured by ink embossing or by printing.

A large amount of tissue is made for waxing. This goes into such things as candy wrappers, butter wraps, sandwich wraps. Waxed on one side and combined with foil it may be used for ice cream or chewing gum. The weight of these papers ranges from nine pounds a ream unwaxed on up into weights heavier than tissue. A high grade paraffine wax is applied while hot and chilled rapidly to obtain as high a gloss as possible.

Pattern paper is used to make dress patterns. Sometimes the design is printed on the tissue from off-set presses and then cut to the desired shape. Sometimes the paper is cut without being printed. This paper is made on an eight-pound basis (24x36—480). It must be kept close to weight so that the postage on the patterns will be kept within limits. It must have a good surface for printing and must be soft enough to cut well when piled in a stack one inch thick. Some pattern is made from sulphite but most of it is made from jute bagging. Besides ream weight, tensile strength is important so that it will run well over the printing presses. This paper must not curl.

Since the advent of the dry mat which is a made up product without tissue the importance of stereotype tissue has steadily diminished. It is an extra strong well formed sheet of tissue usually made from rags. It was used as a facing in the production of the matrix mats. Wet strength was very important.

Carbon paper is made in different grades from the cheapest one-time carbon which is a well closed sheet of 15-pound kraft to the finest four-pound sheet which is not made in this country but imported from England. Furnishes will vary using rags, manila, jute and sulphite. The essential qualities which must be tested for are finish and freedom from pin holes through which the carbon dope might find its way. This paper must not cockle. Prices vary from seven cents to eighty cents per pound.

Condenser is another grade very similar to carbon paper. It is generally made from linens and cottons although a very successful kraft condenser paper was developed and put in use. Beside pin holes, metallic particles, and the usual tests, thickness is very important. This paper must be supercalendered. The ma-

chine making it runs slow and has a very fine wire. Cockles absolutely ruin it for condenser use.

It is understood that cigarette tissue has been attemped by several mills in this country with rather indifferent success. The big tobacco companies are unwilling to risk the good will created by millions of dollars worth of advertising for a small saving per cigarette made by the use of domestic rather than imported paper. It is understood that most of the paper made in this country is exported. Its manufacture calls for the highest degree of technical control.

One of the most interesting and little known uses of tissue is a grade called etching tissue. It is not used by artists but in the cutlery, saw and pottery industries for etching brands, names, designs and decorations into the manufactured articles. The design is printed on the tissue from a master plate and is then transferred to the metal. A special solution frees the paper from the ink which is then treated with acid to etch the design in the uninked portion—directly on the steel. Strength is of utmost importance when pulling away from the metal to be etched and the value of the tissue is little compared to the value of the object being treated. It is generally an all rag sheet.

The lining of envelopes is much more extensive in Europe than in America. The better grades of this paper must be evenly colored and well closed. On the machines which do the lining suction fingers pick up the paper. If it is too porous, they pick up more than one sheet at a time. It is very important that this paper does not curl.

The subject of towel paper is too extensive to proceed with here. It must be absorbent and machine glazed tissue made for second process decorative crépe, preferred because it does not lint off on the créping roll and get under the doctor blade. There is also nitrating tissue, copy tissue, cigar wraps, and many others, which are practically obsolete. It is enough to say that each use has its own characteristics and the tests to be made are those adapted to its use.

It is interesting to note that the use of tissue per capita continues to increase until today from 2½ to 3 per cent of the annual consumption of paper in the United States is made up of tissue grades.

Whitewater Sedimentation Systems..... Part II*

A presentation of theoretical and practical factors in design of equipment to recover desirable materials from whitewater

By O. K. GRAEF
Consulting Mechanical Engineer

IT now remains to determine the shape of the basin to be designed. There is no doubt but that a square foot of tank area will settle a definite amount of solids whether in a round, square or rectangular tank. This being the case it is obvious that conditions of site may be a factor in the determination of tank shape, provided all other things are kept equal. In a circular tank with central inlet, and peripheral outlet, a much longer skimming weir crest is available, and hence the head on the weir will be less than in any other shape tank and consequently finer particles will have a lesser distance to settle, in order to fall below the effects of the rising currents converging to the weir crest, than in a tank of any other shape.

The path the particle will take in a basin, can be plotted from the following formula, using data taken from sedimentation tests.

For circular tanks,

$$(11) \qquad y = \frac{x^2}{2RV}$$

For rectangular and square basins;

$$(12) \qquad y = \frac{Vx}{k'}$$

Where y is the path of the particle; R is the radius of a circular tank; x is the distance from the inlet of the tank; V is the velocity at the overflow; and k' is the downward rate of subsidence. The velocity, V, may be determined from the following:

For circular tanks;

$$(13) \qquad V = \frac{Q}{2\pi R d}$$

For rectangular and square basins;

$$(14) \qquad V = \frac{Q}{l w d}$$

Where V is the velocity at the overflow; R is the radius of a circular tank; Q is the quantity at the inlet; and l, w and d are the length, width and depth of the tank, respectively.

By a suitable transposition of the basic weir formula;

$$(15) \qquad Q = 2/3\sqrt{2g}\, LH^{3/2}$$

the depth of the water, or head on the outflow weir may be determined. The velocity of approach is neglected in this formula because it is too small to affect the result appreciably.

For circular tanks;

$$(16) \qquad H = \sqrt[3]{\frac{0.0028\ Q^2}{R^2}}$$

For rectangular or square tanks;

$$(17) \qquad H = \sqrt[3]{\frac{0.035\ Q^2}{L^2}}$$

Where H is the head on the weir; Q is the quantity flowing; R is the radius of a circular tank; and L is the length of the weir crest.

(*) Part I of this article was published in the August issue.

The rate of subsidence of a particle which will fall below the point where the weir overflow current can pick it up and carry it out of a circular basin of any diameter can be calculated from;

$$(18) \qquad F = \frac{D'}{t} \text{ and } t = \frac{x^2}{2RV}$$

Where D' is the depth a particle must fall in order to be below the effects of the weir head in a circular basin; F is a factor, t is the time; x is the horizontal distance the particle will travel; R is the radius of the tank; and V is the velocity at the outflow weir.

The factor F will now give the time for the same particle to traverse a square or rectangular tank of any cross section, which has the same rate of feed as the circular tank, when divided into the depth of the square or rectangular basin, thus;

$$(19) \qquad t = \frac{D''}{F}$$

Where t is the time; D'' is the depth the particle must fall in order to be below the effect of the weir head in a square or rectangular basin; and F is a factor derived from *(18)*.

The velocity of flow in a rectangular basin is obviously;

$$(20) \qquad V = \frac{Q}{A}$$

then

$$(21) \qquad l = \frac{V}{t}$$

Where l is the length of a rectangular basin of given cross section; V is the velocity of flow; and t is the time.

In this manner, the optimum length of a rectangular basin may be determined which will give equally good results as a circular tank, of similar capacity. After the length, width and depth ratios of the basin have been determined, the average velocity of the water through the basin should be checked. In no case should this velocity exceed 8 or 9 feet per minute, and for good results, 2 to 3 feet per minute is advisable.

Some Practical Aspects of Design

Where the influent is quite dilute, and this is true of most papermill whitewaters, the depth of a settling basin has little or no effect on the rate of subsidence of the solids, which is constant. It is, therefore, possible to increase the efficiency and capacity of any settling tank by the addition of trays and the introduction of the influent to each tray. This has been done in several commercial designs and rather large capacity increases are the rule. The disadvantages of a multiplicity of settling trays lie in the increased operating difficulties, increased expense for labor, power and machinery for the removal of the sludge. The sludge cannot be allowed to build up on the trays for any length of time, because it would soon rise to a point where the overflow stream would again pick it up and carry it out of the basin.

The effect of the depth of the basin on the sludge discharge density is small, the time allowed for the compacting of the sludge being the vital element. It is obvious then that if the sludge is to be returned to the plant at high density, say a consistence of 3 per cent, a very much longer time must be allowed for compaction and consequently a much deeper basin must be designed than if a consistence of 1 per cent were satisfactory. This is, then, a case where the factors of cost, efficiency and size must be balanced economically and the design arranged accordingly.

If the sludge is to be removed by gravity, as in the case of a circular tank with a conical bottom, then a certain amount of experimenting should be done to determine the angle of slope required. In most cases, a cone angle of 60 degrees will be about right for whitewater sludges, but even with a slope as great as this it will be found that an inch or more of the sludge will accumulate on the slope, due to contact action.

In few sedimentation basins have the orifices for sludge removal been properly designed. Some designers have held that a small sludge discharge opening under high head pressure was advisable as it assisted in compacting the sludge. Others claim that large openings under slight heads are advisable for best results. The facts lie between these two extremes.

From a consideration of *(1)* *(2)* and *(3)*, it will be noted that the settling rate of a particle has a negative acceleration. In the top layer the particle is falling most rapidly, and in the bottom layer, most slowly. Then if R is the rate of sludge formation at the desired density, and A is the area of the basin, the maximum volumetric rate at which a sludge may be removed at the desired density, is RA, and the area of the discharge orifice a, must be equivalent to:

$$(22) \qquad a = \frac{RA}{V}$$

Where RA, is the cubical rate of sludge discharge; V is the velocity of discharge; and a is the area of the sludge discharge orifice.

The volume of sludge for any whitewater may be found if the proportion of suspended solids in the water is known. If the sludge is to be removed at 1 per cent consistence, then for each million gallons of influent, containing 1 part per million of suspended matter, 12.5 cubic feet of sludge will have to be handled through the sludge orifice.

The flow of sludge through piping is different than the flow of water, due to the effects of friction of the particles on each other and upon the walls of the conduit. Richards and Dudley (Trans. A. I. M. & M. E., Vol. 51, Pg. 398) assume that these effects may be called viscosity, and give the curves shown in Figure 2, for the determination of the friction factor, f. This chart was plotted from the results of experimental data on siliceous sand of a specific gravity of 2.72, and ranging in size from about 0.1 mm. to 1.4 mm. It has been found, however, that up to consistencies of about 4 per cent, the results closely approximate the flow of sludge in pipes. Richards and Dudley used their value of f in the fundamental flow formula, thus:

$$(23) \qquad Q = A\sqrt{2g\frac{h}{}}$$

Where Q is the quantity; g is the acceleration due to gravity; h is the head causing flow; and f is the friction factor.

The orifice outlet for sludge may also be designed from this formula by the addition of the proper orifice constant, K, for the opening;

$$(24) \qquad Q = KA\sqrt{2g\frac{h}{f}}$$

If the whitewater is untreated chemically, it may be found that the sludge will slime in the pipes, and for

this reason it is desirable to make all of the turns in the sludge pipe with crosses instead of elbows. Two of the cross openings are closed with pipe plugs which may be readily removed for cleaning of the line. If the effluent water is also untreated, it may be necessary under certain conditions, to run this piping in a similar manner.

Experience has shown that recovered whitewater cannot be reused indefinitely in the mill, unless the

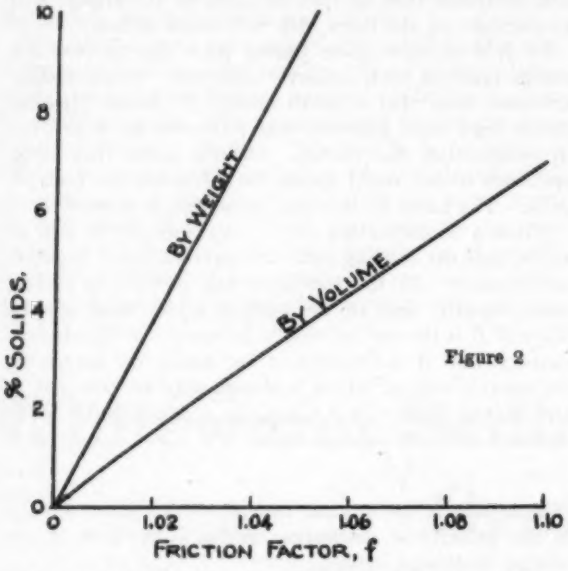

Figure 2

system is bled in such quantities that the matter in solution is held at a low figure. Further, when this is not strictly adhered to, the product suffers in direct relation to the violation. In other words, in a fine paper mill the increased acidity of the returned water will interfere with sizing. If this acidity is neutralized chemically, sulphates will build up in the system, increasing the beating times, and harming the physical characteristics of the sheet. Also when recovery is practised in this way, it becomes necessary to use increasingly larger doses of chlorine or chloramines to control slime, as the system becomes more and more fully closed. The economical balance is not reached before the residual chlorine begins to affect dyes deleteriously.

For these reasons, it has become evident that to fully close a whitewater system a method must be employed which will eliminate all of the defects of the older methods. By a direct attack at the heart of the problem, it has been found that by dosing the whitewater chemically, prior to sedimentation, with a proper combination of electrolytes, it is possible to sediment practically all of the solids in suspension, and a large proportion of the solids in solution. Thus returning to the mill for reuse, a water which is clear, inhibits the growth of slime, and compares favorably with the raw make-up water. Fortunately this treatment also serves to increase the rate of sedimentation considerably, and thus smaller basins may be provided.

This sort of treatment requires the use of mixing chambers prior to sedimentation, although in some cases this may be done in the wire pit. The experiments of John R. Bayless (*Water-works & Sewage*, Aug., 1930) indicate that thorough mixing of electrolytes prior to sedimentation is a necessity for best results, and he advocates that the mixing time be not less than 45 to 60 minutes.

It has been determined that during the admixture of the electrolytes, the mass may be violently agitated, but immediately thereafter, the mixing should be accomplished at a slow rate.

Under these conditions, about all that is required is a vessel of suitable capacity to retain the influent for the desired length of time, and baffled so as to provide a velocity through the vessel of not more than 1.0 to 1.3 feet per second. Velocities in excess of this will delay flocculation and cause the resultant flocs to be too small, while lower velocities are apt to allow preliminary sedimentation in the mixing vessel. After the mixing is complete, the influent should be delivered to the sedimentation basin and introduced over a weir, or preferably through a series of short weir slots in the case of a rectangular basin; or to the influent well of a circular basin.

Prior to the erection of a full-sized sedimentation recovery plant, a small scale, or pilot plant, should be built for the purpose of making a final check on the computations and deductions upon which the large plant is based.

The features that need study should be carefully considered before the erection of the pilot plant. That is, if it is desired to study the probable flow through a large basin, the pilot plant will be operated differently than if it were desired to study settling rates, and it is possible that a different pilot would be built in each case. If it is desired to study flow character and conditions, then the pilot plant must be designed to be hydraulically similar rather than geometrically similar to the large plant. Gibson (Hydraulics and Its Applications, 1925) and Freeman (Hydraulic Laboratory Practise, 1929), show that for a large basin and its pilot to be hydraulically similar, the velocity in the small basin must be $1/\sqrt{m}$ times the velocity in the large basin, and the detention time in the small basin must be $1/\sqrt{3}$ times that in the large basin. Where m is the modulus of reduction, or size ratio of the large basin and the pilot. This modulus must not be taken too large, for if this is done, the pilot will be so small that effects of viscosity and surface tension will render the results very inaccurate. On the other hand, if too small a modulus is taken it will result in the construction of too large a pilot and consequently, unnecessary expense. In this way the action of the water in a large basin may be thoroughly studied inexpensively prior to the construction.

Especial study must be given the problem of reducing the velocity of the influent at the entrance to the basin. In most cases it will be found that the best way of doing this is by the use of a large distributing channel placed behind the weir slots at the entrance. If the influent is flowing at right angles to the basin flow, prior to entry into the inlet weir slots, it will probably be found necessary to construct parallel baffles between the slots on the basin side to force the water into parallel flow lines. If no baffles were provided in this contingency, a relatively strong current would probably flow along one of the basin walls, while the water

along the opposite wall would be nearly stagnant. This would result in a reduction of effective settling area. When it is recalled that in a 50-foot long basin with a mean velocity of 3 feet per minute, the velocity head will be in the neighborhood of $V^2/2g = 0.00004$ feet, or about 1/25,000 of a foot head, the care required to introduce the water properly will be apparent, if by-passing or channeling is not to occur.

The design and construction of a basin for the sedimentation of paper mill whitewaters is a simple matter, but unfortunately a great many basins have been constructed without a great deal of thought being given to the elementary hydraulic principles involved. These basins have poor sedimentation efficiencies, some of them running as low as 30 per cent to 40 per cent. This has done a great deal of harm to the cause of recovery by sedimentation, and in many cases mechanical devices have been installed. Based upon fiber recovery alone, these devices are quite efficient, but based upon overall recoveries of fiber, clay and water, they are inefficient. It can be shown that sedimentation systems of recovery, properly designed and operated, may have overall recovery efficiencies of fiber, clay and water, closely approximating 99 per cent, and further that the recovered water from these systems may be re-used for showers, for furnishing beaters, or for any other purpose for which raw water is now in use, and that without causing ridging or blinding of machine wires, in the case of showers; or loss of physical characteristics of the sheet, when re-used in the beaters.

PAPER DYEING

Affected by Hydrogen ion Concentrations

By J. R. ROBERTS
E. I. du Pont de Nemours & Co., Inc.

IT has been the author's privilege to have been associated with the paper industry for more than 30 years. As most old timers will remember, papermaking in the old days was conducted by the *rule of thumb method* and there were very few technical men around paper mills. Alum was a cure-all for nearly every difficulty encountered on the wet end of the paper machine. If the stock was too slow on the wire, if the color was too light, if the backwaters were colored, or if the sheet was too soft, an order went out to the beaterroom to add more alum regardless of how much was in the sheet or irrespective of any other conditions.

During recent years, chemists have been placed in most mills, and in nearly all the larger organizations a staff of technical control men supervises the procedures with a view to standardizing the furnishes, etc., and effecting economies wherever possible. In the past few years, the so-called pH control of stock in the beaters and on the paper machines has come into use, and we are now beginning to realize the importance of the control of the acidity of the stock.

The literature explains that the pH of a given solution or liquid is the logarithm of the reciprocal of the hydrogen ion concentration which, in other words, means that pH control is the measurement of the acidity or alkalinity of the waters or stocks in the paper mill. By the use of this control, it is possible to keep the sheet going over the machine at the same acidity at all times, and to obtain the maximum uniformity it is only necessary to know just what pH is necessary for optimum results. This applies not only to the dyestuff formula but to various other factors which enter into consideration in the making of a sheet of paper. The hardness of the sheet, the ageing or deterioration, the printing qualities, etc., are all affected by the acidity of the stock.

The importance of pH control in connection with dyestuffs is not yet fully realized, and it seems safe to state that much color is lost and much off-shade paper is made through improper amounts of alum being used with the accompanying wrong pH values in beaters and on machines.

Effect of pH Concentration on Colors

It is generally believed that an excess of alum is necessary with most acid colors. As a matter of fact, most of them give weaker dyeings with the excess of alum, the change being in proportion to the excess used. As an example, the acid orange commonly called orange II or orange Y shows its maximum strength at a pH between 4.5 and 5.0, while at a pH of 4.2 the color will show appreciably weaker. The basic, direct and pigment dyestuffs, with one or two exceptions, do not show any appreciable change at pH values lower than the ones giving the optimum results. All the dyestuffs without exception show weakness at pH values above the ones showing maximum strength. When the direct colors are used on absorbent paper it is possible to obtain greater strength at pH values nearer neutral, using salt and heat, than by the addition of alum with the accompanying lower pH value.

Some of the dyestuffs vary in shade at different pH values, and this fact is the cause of variation of shade in some sheets. As a concrete example, here is a problem at one time encountered: A board mill complained of a wide variation in shade of a brown test liner. A visit to the mill revealed that the shade was being produced with chrysoidine, basic brown, methyl violet and safranine, the pH in the beaters being 5.2 and on the machine 6.2. An addition of alum in the screens threw the shade much redder, showing conclusively that the pH was too high, and not enough alum being used. The shade was eventually matched with chrysoidine, basic brown and nigrosine, running the pH at 4.4 in the beaters and around 5.2 on the machine. In this particular case, corrugated clippings containing silicate of

soda were used in the furnish, and the pH of the beaters before the addition of size and alum was 8.2. Sixty pounds of alum (ordinarily an ample quantity) to 1500-lb. stock had been used, but in this case it required a total of 75 lb. to 90 lb. to neutralize the alkaline stock and produce the proper pH value on the machine. As chrysoidine and basic brown are turned greener by alkali, slight variations in the acidity of the stock would cause the shade to vary from green to red.

In this connection it might be mentioned that it is advisable to check the acidity or alkalinity of certain stocks being furnished to the beater. Bleached sulphite ordinarily is not far from neutral, but some of the kraft stocks are alkaline and some of the unbleached sulphites may be acid. Old papers or mixed papers containing glue, silicate or other adhesives may be alkaline, and corrugated clippings are usually very alkaline.

In another mill using a pigment blue for various shades of white was found a blue white shade being produced with less dyestuff than a light cream shade, the former being run at a pH of 5 and the latter between 6.7 and 7.0. On account of printing qualities desired in the sheet it was necessary to run the cream shade near neutral, and the only remedy was to change from the pigment dyestuff to another type much more fugitive to light. Continuing with the pigment dyestuff was probably the lesser of two evils, so to speak.

Dyestuffs and Alkaline Fillers

It should be remembered that factors other than size and alum affect the pH values of stock, among them being alkaline fillers such as calcium carbonate. This filler, on account of its low cost, white color, and the desirable printing properties it imparts to the sheet, is coming into general use. If any appreciable amount of calcium carbonate is added to the beater, a pH around 7.6 will be produced, and it is hardly possible to lower this pH. Because of this alkalinity, it is impossible to use the acid colors as they are not retained on the stock. The direct colors, some of the basic colors and some of the pigments are not greatly affected by the calcium carbonate. As a matter of fact, most of the direct colors show increased strength and brightness when used with this filler. This is due partly, at least, to the fact that most of the direct colors are dulled by alum and brightened by an alkali. If an alkaline filler is used, the direct colors are the most satisfactory, as regards retention.

In regular work where no alkaline filler is used the direct colors require certain pH values under 7.0 for optimum results. It has been our experience that when the carbonate filler is used with direct colors the results are satisfactory even though the pH is raised.

In the past, most white book and magazine sheets have been dyed with pigment blues. It has been ascertained that when calcium carbonate is used in these sheets, fairly satisfactory results may be obtained by furnishing the stock, pigment blue, size, alum and filler in the order named. If the filler is added before the pigment blue is set on the fiber by the size and alum, much of the color will be lost.

As calcium carbonate practically destroys the sizing, many of these sheets are now made with no size or alum. In these cases it is necessary to select the brightest of the direct blues and reds, and those least affected by the alkaline filler.

Another problem encountered by the board mills, particularly those making white patent coated, is the calcium carbonate in the soft white shavings which is usually part of the furnish. The time is rapidly approaching when practically all book and magazine sheets and therefore soft white shavings will be filled with calcium carbonate.

In the board mill, some degree of sizing is usually desired in the liner, and it is therefore necessary to neutralize the calcium carbonate in the soft white shavings. This can be effected by the use of alum, but this is rather expensive. It has been ascertained that sulphuric acid will do the work effectively, and at a lower cost. In actual practice it required approximately 72 pounds of commercial sulphuric acid to neutralize 100 lb. of calcium carbonate filler. Incidentally this solves any dyestuff problem connected with the coloring of the white lined board, for after the carbonate has been neutralized any type of dyestuff may be used.

It might be mentioned that when soft white shavings, containing calcium carbonate, are used a pH control of the beaters must be maintained as the carbonate filler content varies from bale to bale. The pH of each beater must be taken, and enough acid added to bring the pH to the desired point. If too much is added, the color will be weakened, particularly when using pigment blues.

Optimum pH for Maximum Color Strength

It has been the experience of the author's company that the pH values at which different dyestuffs show maximum strength vary considerably, and that no one pH can be established for each group of dyestuffs. Also, that in the acid group there is a variation of over one unit between the high and the low, and while the other groups may be more consistent, there are decided differences in the pH values at which best results are obtained.

The du Pont laboratory has been able to work out the accompanying table showing the pH values at which optimum results are obtained with the principal paper dyestuffs, and the change in strength and shade at higher and at lower pH values. In many cases the pH values have been checked by mill runs, and the results have been very consistent. As an example, this table gives a pH of 5.6 for purpurine 4B conc. and it is known that mill runs having been made with this dyestuff in which the pH at the headbox was maintained, using no soda ash, the shade remaining bright and uniform throughout the run.

In conducting the laboratory work very nearly neutral water at a pH around 7 was used. Twenty pounds of size (2 percent) was used in all the dyeings and varying amounts of alum used to produce the different values. With uncolored samples the amounts of alum used with the corresponding pH values were as follows:

For 1000-lb. stock	
3 lb. alum	pH 7
7 lb. alum	pH 6.8
11 lb. alum	pH 6.4
17 lb. alum	pH 5.6
25 lb. alum	pH 4.8
60 lb. alum	pH 4.2

These amounts of alum were used with each of the

dyestuffs in the table. It will be noted that there are some variations from these values in the table, but these could have been caused by the dyestuffs themselves and slight variations in the water used.

The pH values as given represent the stock at the headbox after dilution with water and correspond to the stock as it is ready to go over the wire of the paper machine. In most cases the pH in the beater would be lower, but in the so-called closed systems when the machine waters are used over and over the acidity might build up to a point where the pH values in the beater and at the headbox might more nearly be equal.

Amount of Alum and pH Values for Maximum Color Strength

Acid Colors	Optimum	pH	Higher pH	Lower pH
Metanil Yellow Conc.	17 lb.	5.6	weaker	duller
Quinoline Yellow Conc.	25 "	4.6	"	no change
Quinoline Yellow P Ex. Conc.	17 "	5.6	"	weaker
Orange II Conc.	25 "	4.7	" redder	"
Orange RO	17 "	5.6	" "	"
Brilliant Crocein FL	25 "	4.7	" bluer	no change
Anthraquinone Blue B	17 "	5.6	" redder	weaker, greener
Green BL Conc.	17 "	5.6	"	" trace yellower
Green NV Conc.	17 "	6.0	"	no change
Nigrosine WSB Powder	25 "	5.6	" redder	weaker, redder
Basic Colors				
Auramine Conc.	17 "	6.0	weaker, greener	no change
Chrysoidine GN	25 "	4.8	" "	" "
Basic Brown BR	17 "	5.6	" "	" "
Rhodamine B	17 "	6.0	"	" "
Safranine T Extra	11 "	6.4	"	" "
Methyl Violet NE	17 "	5.6	" redder	greener
Methylene Blue ZX	11 "	6.4	"	no change
Paper Blue R Conc.	17 "	5.6	" redder	greener
Victoria Blue BX	11 "	5.2	" greener	no change
Victoria Green SC	17 "	5.7	"	" "
Direct Colors				
Brilliant Paper Yellow Conc.	17 "	5.6	weaker	no change
Stilbene Yellow G Conc.	17 "	5.4	" redder	" "
Fast Yellow L2RX	17 "	5.6	"	" "
Fast Yellow NN	17 "	5.6	"	" "
Yellow CH Conc.	25 "	5.0	" greener	" "
Yellow SXP	25 "	5.0	"	" "
Fast Orange WS	17 "	5.6	" redder	" "
Brown D3GN	25 "	4.8	"	" "
Purpurine 4B Conc.	17 "	5.6	"	bluer, duller
Fast Red 8BL	17 "	5.6	"	no change
Fast Scarlet 4BS	17 "	5.6	" bluer	" "
Violet N	17 "	5.7	" "	trace bluer
Blue BBF	17 "	5.6	" greener	no change
Sky Blue 6BX	17 "	5.5	" "	trace weaker, " greener
Fiber Black N	17 "	5.7	" "	redder
Black E	17 "	5.7	" "	"
Diazo Black BH Conc.	17 "	5.6	"	no change
Pigment Colors				
Paper Blue S	25 "	4.8	weaker	no change
Blue R	17 "	5.6	"	" "
Blue RP	17 "	5.6	"	" "
Vat Colors				
Blue RP Triple Powder	17 "	5.6	weaker	trace weaker

(All color designations in the above table refer to products of E. I. du Pont de Nemours and Company.—Editor)

Testing Water Resistance of Paper Products

THE Bureau of Standards suggests a modified procedure for its dry-indicator test for water resistance of paper products, for use in testing very resistant products such as fiber boards and waterproofed papers.

The dry-indicator method consists in sprinkling a mixture of sugar and water-soluble dye on one side of the test specimen and applying water to the opposite side. The time required for the water to penetrate through the specimen, which is indicated by development of the dye color, is the measure of the water resistance. In testing very resistant products, it is necessary because of the slow permeation of moisture, to have means of retaining the transuded moisture on the surface of the paper until it becomes sufficiently condensed to effect the indicator. The following procedure serves this purpose, is simple, and has the advantage of continuous visibility of the indicator.

The edges of the test specimen, about three inches square, are sealed by dipping into a suitable material such as beeswax, asphalt, or pitch. The indicator powder is now sprinkled on one side and a transparent cover, such as a watchglass or a piece of celluloid, is scaled over it. The coverglass should be somewhat smaller than the specimen and, if the nature of the material will permit it, the edges of the specimen can be bent up so that they will not come in contact with water at all when the specimen is floated. The seal is made with molten beeswax or pitch applied with a medicine dropper around the edges of the coverglass. Beeswax, or preferably beeswax containing a small amount of carnauba wax, will suffice for most materials. In some cases it is necessary to make the seal with pitch in order to prevent the specimen from pulling away from the coverglass when it gets wet. The specimen so prepared is floated on water at a given temperature and a measure is made of the time required for the water to cause coloration of the indicator.

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◆ EFFICIENCY of a practically flawless kind may be reached naturally in the struggle for bread. But there is something beyond—a higher point, a subtle and unmistakable touch of love and pride beyond mere skill; almost an inspiration, which gives to all work that finish which is almost art—which is art.—*Joseph Conrad.*

Analyzation of Coated Papers

By EDWIN SUTERMEISTER
Chief Chemist
S. D. Warren Company

THE analysis of a coated paper is often desired by a paper manufacturer as a means of checking his competitors' products against his own. For this purpose he usually wants to know not only the substances used but the approximate amount of each present in the coating.

In the early days when comparatively few materials were used in this work, an analysis of reasonable accuracy was supposed to be not very difficult to make. This supposition was confirmed in several cases where coatings of known composition were analysed and the results found to check quite closely with the actual facts. More recently, however, many more materials have been employed and some of the older ones have been derived from different sources or made in different ways which has caused differences in their chemical composition. This has made it desirable to review the situation with some care in order to see just what can be expected of such an analysis.

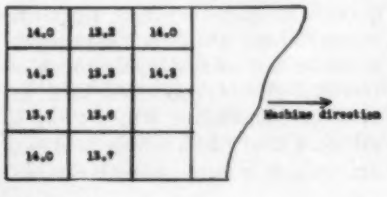
In the first place, it should be recognized that the actual chemical analysis can be made with as great accuracy as the usual methods for the different substances permit. No serious criticism of this part of the procedure can be made, but when it comes to interpreting the results, it is quite another story and the following notes are offered to show what may be expected along such lines.

Amount of Coating

The amount of coating is usually determined by washing it off and assuming that the difference in air-dry weight of the paper before and after this treatment is the air-dry weight of the coating. Since a considerable volume of treating solution and wash water is necessary to get the coating all off, it is inconvenient to save the material thus removed and use it for analysis. It is, therefore, customary to use one piece of the paper for the coating determination and another from the same sheet for the quantitative estimation of the coating elements. This, of course, assumes that the weight of coating is uniform throughout the sheet, which is a risky assumption to make.

To see just how risky, a sheet of commercial paper, coated one side, was cut into pieces 6x8 inches and the coating determined on ten of them. The accompanying diagram shows the location of the samples and their coating in pounds per ream, 25x38—500 sheets.

This paper was selected at random, and it is not known whether the variation is greater or less than usual, but since it is a commercial sample, it is fair to use the results for comparison. If the average for the entire sheet (13.8 lb.) is assumed to be correct, it is evident that the percentage of any constituent might vary from 0.965 to 1.045 times the true value.



In the face of this evidence, it hardly seems that the average of two analyses on samples of only 10 square inches area, as recommended by the Technical Association of the Pulp & Paper Industry, is sufficient to give reliable results.

Casein

The generally accepted method for determining casein in a paper is to determine the nitrogen by the Kjeldahl method and convert this to casein by multiplying by a factor. If all casein contained the same amount of nitrogen and if no other nitrogenous materials were present in the paper, this procedure would be entirely satisfactory, but, unfortunately, neither is always true.

According to Browne *(Ind. Eng. Chem.* 13 (1919) 1019), if the nitrogen found is multiplied by 6.38, the result will be the fat-, ash-, and moisture-free casein. This factor is very nearly the same as that recommended by T.A.P.P.I., which is 6.3 for casein.

From the standpoint of the paper coater, an analysis is not of interest as showing how much pure casein is in his competitor's paper, but as indicating how much commercial casein he used. For this purpose, the factors should be based on casein as delivered, with its content of fat, ash and moisture, rather than on the pure material.

Browne's analyses of commercial caseins show a range in nitrogen content from 15.32 to 13.22 per cent on the fat-, ash-, and moisture-free basis, which would indicate a pure casein content of 97.8 to 84.4 per cent. His figures show the ash, fat and moisture to vary from 2.07 to 6.10, from 0.0 to 2.48 and from 4.86 to 10.89 per cent respectively when considering caseins other than rennet and Indian. If the sum of the maxima and the sum of the minima is added to each percentage of pure casein, it will be found that the corresponding commercial caseins would range from 91.3 to 117.3, and if these are divided by the maximum and minimum percentage of nitrogen which he gives, the factors to convert nitrogen to commercial casein will vary between 5.96 and 8.87.

This is a wholly theoretical calculation, as it is improbable that the maxima or the minima would all occur in the same casein, but it indicates the possible variations in the factors. That it is not entirely fantastic is seen from the accompanying table showing analyses of commercial air-dry caseins and the factors calculated from them. These analyses were made by the author or his associates.

Origin of Sample	Date of Analysis	Percentages on air-dry casein			Factor N X
		Ash	Moisture	Nitrogen	
Domestic	1928	1.37	10.2	13.00	7.69
"	"	2.71	8.2	12.00	8.34
"	1933	...	7.6	13.33	7.50
"	"	...	7.8	12.95	7.72
"	"	...	6.4	13.54	7.38
Argentine	1923	3.15	10.2	11.70	8.54
"	"	2.67	10.2	11.10	9.01
"	"	2.68	11.4	11.00	9.10
"	1933	...	8.3	13.67	7.32

For the sake of calculation, assume that 7.35, which is the average of the four possible factors from Browne's analyses, is the correct figure to use. Then if the factors 8.87 or 5.96 were used, the casein found would be 120.8 or 81.1 per cent of the actual. Since there is no certainty that 7.35 is the correct factor, in any given case this may be interpreted as showing that a coating which contained 20 per cent of casein, when calculated by the factor 7.35, actually contained from 24.2 to 16.2 per cent according to the grade used.

Thus far, the discussion of casein has assumed that the paper contained no other nitrogenous material, but it is entirely possible that ammonia was used as the casein solvent and that some of this remains in the paper. Probably any free ammonia, over that necessary to combine with the casein, would be driven off during drying and calendering. To produce a neutral solution of casein requires on an average about 3.15 per cent of NH_4OH or 1.26 per cent of nitrogen, based on the commercial casein. If all this is retained in the coating, the nitrogen determined would be increased to such an extent that if the factor 7.35 is used, 109.3 lb. would be reported for every 100 lb. actually used. This error is additional to that in the casein factor and means that a coating containing 20.0 per cent of casein might be reported as containing 26.0 per cent.

No attention has been given to the possible presence of glue in the coating

and it is very unusual that casein and glue are used together. If glue is used alone, the factor recommended by T. A. P. P. I. is 5.6 x nitrogen.

Any discussion of starch as an adhesive is also intentionally omitted because it is seldom used, in comparison with casein, and not because its estimation involves no errors.

Clay

The estimation of clay in the coating seems to be possible only by calculation from the ash of the total paper after deducting that of the other constituents of the coating and that derived from the filler in the body stock. The calculation, to be described later, has the advantage that it takes into consideration only the ash in the body stock, and it makes no difference whether this is derived from clay, talc, calcium carbonate or other mineral filler.

Clay consists chiefly of hydrated aluminum silicate with slight amounts of impurities, but none of these is sufficiently constant in quantity to be used as a measure of the amount of clay present. Any calculation from the alumina present in the paper is out of the question because this substance would be contributed also by the alum used in sizing and by the satin white in the coating. The only remaining constituent which might be used as a basis for calculation is the silica, and unless silicates are used in sizing, there is probably very little silica contributed by anything but the clay.

From various sources, the maximum and minimum figures for alumina, silica, loss on ignition and titanium dioxide content of washed commercial clays have been assembled as follows:

	Maximum	*Minimum*
Alumina, Al_2O_3	46.82	30.98
Silica, SiO_2	55.12	32.11
Loss on ignition	18.67	9.75
Titanium dioxide, TiO_2	1.69	0.38

These figures include both English and American clays, but no claim is made that they cover the field completely, nor is it certain that they are all of grades which are customarily used in either coating or body stock.

If it is assumed for the sake of comparison that the analysis of the coating shows 23 per cent of silica, the equivalent clay, calculated from the maximum and minimum figures given in the table, would vary from 41.7 to 71.7 per cent of the coating. Even half this variation is much too great for the accuracy desired in coated paper analysis.

In case the calculation is not made from the silica but is based on the ash determinations, the final conversion of ash to clay depends on the use of a factor for loss on ignition, and as will be seen from the table, this is subject to wide variations in different clays.

Satin White

Satin white is a complex pigment, which, for the sake of analysis, may be considered to contain calcium sulphate, alumina and calcium hydroxide. There is no other element or group of elements, which is peculiar to this pigment and not found in the other coating minerals or fillers, so the estimation of the amount of satin white present depends on calculation by means of a factor applied to the amount of one of the elements or groups of elements.

The alkalinity of the paper caused by the satin white is not a safe measure to use because the alkalinity of the coating would be reduced by the acidity of the body stock and by the absorption of carbon dioxide from the air, and still more because the excess of alkali used in dissolving the casein would all be calculated to satin white. The alumina content of the satin white is an unreliable criterion because alumina is also contributed by clay and alum, and since the amount in satin white is relatively small, the errors caused by analysis and assumptions would be correspondingly great. There remain, then, only the calcium oxide and sulphur trioxide groups which could be used as measures.

To see which of these shows the greater constancy in satin white the analyses of ten samples from four concerns over a period of 20 years have been tabulated with the following results:

	Max.	*Min.*	*Av.*	*Variation from Av.*
CaO	46.0	37.4	41.1	112.0 to 91.0%
SO_3	32.0	24.5	29.5	108.6 " 83.1"

At present there are being made and used in coating several different grades of satin white. Some of these are made by direct mixture of the constituents at such high density that they need no filter pressing, while others are made at greater dilution and are filter pressed and washed before use. It would seem that the differences shown in the table are not necessarily due to changes in methods of manufacture during the period covered, but would be likely to be duplicated in a group of present-day products.

Since there is little difference in the constancy of these two substances in satin white, it becomes a question of which is easier to determine and which is less interfered with by other substances in the paper. Calcium is contributed by the ash of the fiber used, by any calcium carbonate or sulphate used as a filler or in the coating, and by small amounts of impurities in the clay as well as by the satin white itself. Sulphur trioxide would be contributed by the alum, by the satin white, by blanc fixe and under certain conditions of analysis by the oxidation of zinc sulphides. There is probably little to choose as to ease or accuracy of determination, but in the case of SO_3 there is a possible error which has not been investigated and the magnitude of which is, therefore, not known. This is the possible loss of SO_3 from the $CaSO_4$ during the ignition of the coated paper to a white ash. It is known that such a loss occurs during the ignition of $CaSO_4$ itself, but whether it takes place to the same extent in igniting satin white is not known.

On the whole, it seems that the estimation of satin white is somewhat more easily and accurately accomplished by using the CaO content as a basis for computation. The variation in commercial satin whites is great enough, however, so that a content of 20 per cent, as calculated from the average factor, might actually be anywhere between 18.2 and 22.4 per cent.

Blanc Fixe

This is one of the few substances in a coating which can be readily determined and interpreted with reasonable certainty. There is no source of barium in coatings except intentional additions and no other form than the sulphate is commonly used. This may be added as such or associated with zinc sulphide as a lithopone, but in either case there is no uncertainty as to what was employed.

Calcium Carbonate

This substance is quite extensively used in coatings and sometimes in the body stock also. Since calcium is present from a number of other sources, it seems that the most reliable way to estimate the amount of $CaCO_3$ is to determine the amount of CO_2 present and calculate the corresponding quantity of $CaCO_3$.

If qualitative tests of the body stock from which the coating has been removed show the presence of $CaCO_3$ as a filler, the determination of CO_2 must be made on both the entire paper and the body stock in order to determine by difference the amount in the coating.

There are certain possible errors of unknown magnitude in the determination of $CaCO_3$ as carried out in this way. In the first place, it is quite common to use a considerable excess of soda ash in dissolving the casein and any of this remaining in the coating will yield its CO_2 and be calculated as $CaCO_3$. The second error is caused by the absorption of CO_2 from the atmosphere by the satin white in the coating. So far as is known, no attempt has ever been made to see how large this error might be, but it would probably vary with the age and condition of storage of the sample. Its limit would be the CO_2 necessary to combine with at least one-half of the total calcium in the satin white present.

Titanium Dioxide

This is one of the newer pigments in coatings and it may be determined quantitatively without difficulty. The interpretation of the results is, however, open to certain errors.

Domestic clays are known to contain from 0.38 to 1.69 per cent TiO_2 and while very few figures are available, English clays are believed to contain rather less. If the analysis shows an amount of TiO_2 equivalent to not over 2 per cent of the clay present, it is probably safe to assume that it comes from this source, but if it is appreciably greater than this, it was probably added intentionally, either as TiO_2 itself or as some of the manufactured pigments which contain it. If the clay used is known to be of English origin, the allowance of 2 per cent is quite probably too high.

Zinc Pigments

These are of even more recent introduction than the titanium pigments and their use is probably far from general. For this reason, little can be said about their determination, except that there is no other probable source of zinc in coated papers so its presence must be taken as indicating intentional additions.

In estimating the nature of the pigment added, it may prove to be necessary to determine the sulphur evolved from sulphides as a means of calculating the ZnS present. If no hydrogen sulphide is evolved on treating the paper with acid it is a probable indication that the zinc was added as oxide. The presence of other pigments will have to be considered in connection with zinc sulphide as numerous lithopones have been proposed as coating pigments. These contain varying amounts of barium sulphate, so if the two pigments are found in the same paper, it is reasonable to assume that a lithopone was employed.

Proposed Methods of Calculation

It would seem that the foregoing notes have proved quite conclusively that there can be no universally accurate method for calculating the composition of a coating from the chemical analysis. If it is known that the paper in question was made by a certain concern and that they were using clay, satin white, etc., of definite grades, then a fairly accurate calculation can be made. Unfortunately, such information is seldom available and in its absence about the best that can be done is to use the average figures for each of the ingredients.

Not taking into account the details of the methods of analysis, which it is assumed are familiar to the reader or may be readily obtained from standard text books, the following method of procedure is offered for consideration and criticism.

Determine these facts:

1—The weight of coating expressed as pounds per ream and as a percentage of the air-dry coated paper.

2—The ash in the coated paper.

3—The ash in the body stock from which the coating has been removed by trypsin.

4—The percentage of any or all of the following which may be found in the coating: nitrogen, CaO, BaO, TiO_2, ZnS, SO_3, CO_2.

From these data, the composition of the coating may be calculated somewhat as follows:

The per cent nitrogen found (based on the coating) multiplied by 7.35 will give the per cent of commercial casein containing the average amounts of moisture, fat and ash. This factor is the average of 82 analyses reported by Browne and the nine previously given in this paper.

Titanium dioxide is determined as such but interpreted according to the other materials present. If it amounts to not over 2 per cent of the clay present, it probably came from that source. If barium sulphate is present in the proper proportion to correspond with some of the commercial pigments it was probably added as such; while if neither of these appears probable the titanium dioxide may have been added in the pure form.

Zinc pigments are in somewhat the same category as titanium in that they may be added as straight zinc compounds or in combination, chiefly with barium sulphate as lithopones. If zinc is present and sulphides absent, it may indicate that zinc oxide was used.

Calcium carbonate is best calculated from the amount of CO_2 found by analysis. As noted, it may be necessary to correct for the amount present in the body stock.

Blanc fixe is calculated from the amount of barium found, but it may be present as blanc fixe itself or associated with other pigments, as TiO_2 and ZnS.

Satin white may be calculated from the calcium oxide found after deducting that corresponding to the calcium carbonate present. It is best to check the amount of CaO against the SO_3 present (after deducting that in blanc fixe) to see if they are in about the proportion found in satin white. If the per cent of CaO which is probably present as satin white is divided by 0.411, the result will be the per cent of satin white as dried at 135 deg. C., and if this figure is divided by 0.700, the per cent of air-dry satin white will be found. This last factor is the average of drying tests on five samples which showed that the air-dry satin white lost 30 per cent of its weight on further drying at 135 deg. C.

Clay is the residuary legatee of this procedure and inherits all the errors of the other calculations since it has to be calculated by a somewhat roundabout process.

From the ash in the total paper deduct that in the corresponding weight of body stock, thus obtaining the ash in the coating. From this figure deduct the combined ash from the other constituents of the coating, as blanc fixe, calcium carbonate, titanium oxide, zinc pigments and satin white. (For the latter the bone-dry weight times 0.754 will give the average ash.) The figure thus obtained is the ash from the clay, and this divided by 0.88 will give the dry English clay present. If American clay was probably used, the factor would be about 0.865.

In reporting such an analysis as this, especial care should be taken that the person to whom the report is made is aware of the limitations of the work and does not assume that the calculated results are accurate to a tenth of a per cent.

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Substitutions in Code of A. P. & P. A. Approved

Under date of August 15, Charles W. Boyce, Executive Secretary of the American Paper and Pulp Association, notified paper and pulp manufacturers that the Administrator had approved the substitution of the wage and hour provisions of the General Code of Fair Competition for the Paper and Pulp Industry, with some modifications for corresponding sections in the President's Reemployment Agreement. The full text of the Code for the paper and pulp industry was published in the August issue of THE PAPER INDUSTRY, and the following is the petition to the Administrator for N. R. A. consent to the substitution of Article IV, Sections 4 and 1, as amended:

Petition for Substitution

The undersigned, being duly constituted representatives of the American Paper and Pulp Association, do hereby petition the National Recovery Administrator to consent to the substitution of the following paragraphs of a code of fair competition for the American Paper and Pulp Association heretofore submitted.

ARTICLE IV—SECTION 4

No factory or mechanical workers or artisans except research employees and woods' labor (subject to terms of Lumber Code), shall work more than eight (8) hours in any day or an average of more than forty (40) hours per week in any period of four (4) consecutive weeks.

In this connection it shall be understood that the word "maximum" appearing as the fourth word in line twelve (12), paragraph four (4), of the President's Reemployment Agreement as printed in Bulletin No. 3, National Recovery Administration, shall refer to the forty (40) hour-week as included in this proposed substitution.

ARTICLE IV—SECTION 1

On and after the effective date of this Code, the minimum wage that shall be paid by employers in the industry to any of their employees except apprentices during a six (6) weeks' apprenticeship and woods' labor (subject to terms of Lumber Code) shall be

(a) Northern Zone, which shall consist of all of the territory of the United States except the states named in subdivision (b): Male labor, 35 cents per hour; female labor, 30 cents per hour.

(b) Southern Zone, which shall consist of the States of Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, the District of Columbia, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas and Texas: Male labor, 32½ cents per hour; female labor, 30 cents per hour.

The above minimum wages shall not in any way be considered as a discrimination by reason of sex and where in any case women do substantially the same work or perform substantially the same duties as men they shall receive the same rate of wages as men receive for doing such work or performing such duties.

For paragraphs 3 and 6 of the President's Reemployment Agreement.

Dustless Re-handling of Salt Cake

By E. P. GLEASON
Manager of Power & Engineering
Nekoosa-Edwards Paper Company

DURING the summer of 1932, the Nekoosa-Edwards Paper Company at Port Edwards, Wisconsin, put in operation an interesting system of conveyors for handling granulated salt cake from box car to smelter as part of the new equipment installed in the remodeling of its recovery plant.

In utilizing this new conveying system, carloads of salt cake are spotted on a side track near the hopper of a bucket elevator. The granulated salt cake is shoveled and trucked from the car, dumped into the hopper of the bucket elevator and raised to a horizontal belt conveyer above the storage bin on the second floor. This storage bin has a capacity of 500 tons.

Three chutes at the bottom of the storage bin deliver the salt cake to a horizontal screw conveyor. A slide in each chute enables the operator to fill the screw conveyor from any of three sections of the storage bin. About ten minutes is required to open a slide, remove sufficient salt cake, and close it again.

The horizontal screw conveyor delivers the material tangentially to a Link-Belt Rotor Lift or vertical screw conveyor, having a lift of thirty feet. The Rotor Lift empties into a storage tank of thirty-two tons capacity, which is filled in three and one-half to four hours, and has an overflow back to the five hundred tons capacity storage bin. No attention is required to fill the storage tank other than to start the conveyor system and shut it off when the tank is filled.

From the storage tank the salt cake is fed and measured automatically to a tank sunk in the floor and therein is mixed with black liquor. The measuring device and mixing tank agitator are driven by a 5-hp. motor through two roller chains.

The automatic measuring device can be set to deliver from 280 to 2,350 lb. of salt cake per hour. Normal operation requires about fourteen tons of salt cake per 24-hour day.

From the mixing tank, the salt cake suspended in the black liquor is pumped directly to a new combined rotary furnace and smelter unit equipped with waste heat boiler. The older units are not equipped to smelt the mixture of black liquor and salt cake. The salt cake must be moved in a wheelbarrow and shoveled into the smelter by hand.

That part of the handling system—from horizontal screw conveyor to pump for handling the mixture of black liquor and salt cake—has two distinct advantages over the old method.

(a) Dust from the light granulated salt cake is eliminated and the department is more comfortable for the workmen.

(b) Working three shifts, the conveyor system effects an annual saving of $2,180 over the former method of handling the salt cake.

A bucket elevator on 30-ft. centers, 15-ton capacity per hour at 100 feet per minute, was originally considered for handling the salt cake from storage bin to the tank over the measuring device, but was rejected in favor of the screw conveyor system for the following reasons:

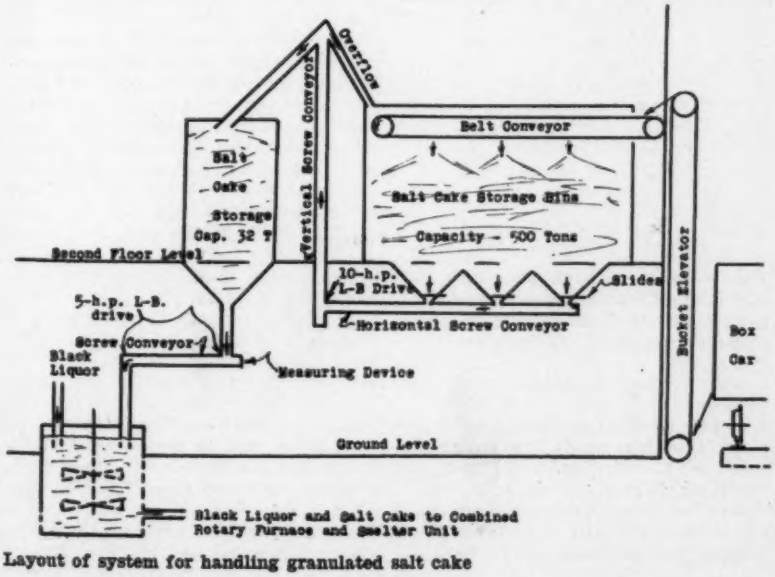
1—Granulated salt cake is very dusty, and the casing of either type of conveyor must be absolutely air-tight. It is easy to make tight joints on the screw conveyor, and the vertical screw conveyor or Rotor Lift was furnished with a one-piece spirally welded steel casing.

2—The first cost of the vertical screw conveyor system was found to be less than for a bucket elevator.

3—The greater simplicity of the screw conveyor should mean lower maintenance.

4—The screw conveyor is quieter in operation, and its erection cost smaller.

5—Less space is required for the screw conveyor.



Layout of system for handling granulated salt cake

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◆ Organize Association of Pulp and Paper Mill Mach'y and Equipment Mfrs.

The National Association of Manufacturers of Pulp and Paper Machinery and Equipment is now being organized following a meeting held at the Hotel Commodore in New York City on August 23.

An organization committee of five was appointed at the meeting which was attended by the representatives of sixteen machinery companies to draw up a set of by-laws and a code for formation at a meeting which will be called later to which all those eligible to the association will be invited.

Phillips Dennett, of the Bird Machine Company, is the chairman of this organization committee of which the other members are W. B. Wilshushen of the Cameron Machine Company and Walter L. Barker of the Improved Paper Machinery Company. John Cornell of *The Paper Mill* was appointed acting secretary. The representatives of the following sixteen companies attended the meeting:

American Paper Machinery & Engineering Works, Glens Falls, N. Y.; Bevis Machine Co., Middletown, Ohio; Bird Machine Company, S. Walpole, Mass.; Cameron Machine Co., Brooklyn, N. Y.; Carthage Machine Co., Carthage, N. Y.; Clark-Aiken Co., Lee, Mass.; Filtration Engineers, Inc., Newark, N. J.; Glens Falls Machine Works, Glens Falls, N. Y.; Improved Paper Machinery Co., Nashua, N. H.; E. D. Jones & Sons Co., Pittsfield, Mass.; Montague Machine Co., Turners Falls, Mass.; J. O. Ross Engineering Corp., New York City; Swenson Evaporator Co., Harvey, Ill.; Trimbey Machine Works, Glens Falls, N. Y.; Union Machine Co. and Union Screen Plate Co., Fitchburg, Mass., and the Valley Iron Works Appleton, Wis.

◆ ATTENTION OF the Customs Official has been called by the Import Committee of the American Paper Industry to the probable violation of the Anti-Dumping Act in the importation of orange colored newsprint for an automobile tire manufacturer, and of white newsprint for a motor gasoline manufacturer.

In both cases, foreign paper is being sold for these special uses at about $8 per ton below the lowest prevailing prices for similar papers.

Management Looks at POWER COSTS

By CHESTER REED EARLE

From this 5000-kw. turbo-generator installed in a large paper mill, steam at both 125 lb. and 25. lb. is extracted for process work

WHEN paper mill management looks at power costs, it sees an item that merits the most careful scrutiny at this particular time. Power and steam costs have always been important to the paper industry, as they constitute anywhere from 15 to 30 per cent of the cost of the product. During the past three years, a period of low prices, low output and low wages, all manufacturers have been urged to prepare for the upturn. Despite the fact that such preparation meant spending money just at the time when there was the least money available to spend, a number of paper mills have rehabilitated their power plants or built new ones during this period. Now, with the upturn actually here, it begins to look as though the managements that failed to see the advantages of the idea would be forced to form an "I wish I had" club.

For consider what is happening. Paper prices are going up. If the National Industrial Recovery Act operates as its supporters desire, wages also will go up, so will taxes, so will fuel prices, so will every item that enters into the cost of power—all this with the idea that the entire nation will benefit. How then is paper mill management to keep the total cost of power and steam at the lowest possible point?

That question, of course, brings up the further query: Does all this discussion of industrial power costs mean anything? Considering what has happened in the past three years and what may happen in the next three, does it get us anywhere to talk about paper mill power plant costs? If so, what are the phases of the subject of most importance to management?

Value of Power Cost Comparisons

So far as comparisons of the power and steam costs of various plants in an industry are concerned, there is a feeling among engineers that they do not prove anything. Because of the prevailing system of buying equipment, first costs will vary somewhat. Taxes vary, fuel costs vary, load conditions are never the same in two plants and by the time all these variations are taken into account the comparison has lost its force.

Instead of worrying about power and steam costs of other plants, the mill management is better advised to attempt to get those costs in its own mill down to the lowest point warranted by its own operating conditions and policies. It should be remembered also that lowest possible cost of power plant service is not necessarily the principal criterion. It may be that lowest cost can be obtained only at the expense of absolute reliability, or that a power and steam plant that supplies low-cost service will have too high an obsolescence factor.

On the whole, then, it appears to many power engineers that although power cost comparisons between various plants do not prove much, at the same time the paper mill management must look at its own costs frequently and carefully. When it does so, the following phases of the subject seem to deserve the most consideration.

1—Reliability and continuity of power and steam supply.

2—Adequate return on investment,

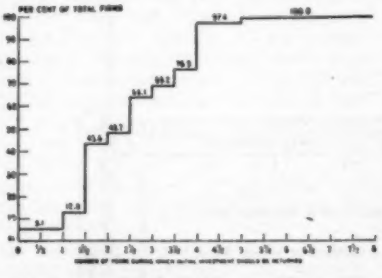

Fig. 1—Chart showing practice of 200 industrial companies in regard to time in which investment must be returned in savings

which involves consideration of obsolescence.

3—Low cost of operation of power plant, in other words low power and steam cost including both fixed and operating charges.

Whether these three factors are listed in the order of their importance to all executives is a question. To the luckless wight who has to sustain the brunt of the attack from everybody, president to back tender, when a machine has to be shut down because of power or steam trouble, it seems that the only thing of any interest at all is continuity of operation. Yet is it? How many a paper mill management knows what percentage of its machine shut-downs are caused by trouble with the power equipment? Can too much money be spent in trying to insure complete freedom from such trouble? The author does not pretend to know the answers to these questions. But the management of a paper mill, it would seem, should have either a policy, an opinion or some facts that would answer them for its particular mill. The value of continuity of service will be different in each case.

As to the obsolescence factor, here again we enter the realm of opinion. How are we going to predict with engineering accuracy whether the power plant we build this year will be completely outmoded in another ten years by the rapid technical advances that may take place? Will those advances occur as rapidly in the next few years as they have in the past few years? Moreover, do we wish to calculate our power plant investment on the same basis we use for our process equipment?

For example: The chart shown in Figure 1, taken from the Report on Recent Economic Changes, shows that it has been the general policy of some 200 concerns to require the savings or profits from new equipment to return the entire investment in not more than five years and the majority in three years. That is just another way of saying that they based their investment return on the economic life of equipment rather than on its physical life. That in turn

is a way of saying that they selected the equipment with the understanding that it might become obsolete long before it was worn out.

To put the matter in still another way, the following table shows the percentage of the initial investment that must be applied as fixed charges to write off the investment in from one to five years, with interest at 6 per cent, compounded annually, and insurance and taxes at 3 per cent:

Years	Percentage
1	109.
2	57.5
3	40.4
4	31.8
5	26.7

When power plant investments, whether for a new plant or for rehabilitation of an old plant, are analyzed on this basis, the results will be somewhat different from those obtained by the usual methods based on the physical life of the equipment.

On the other hand, is the paper mill justified in such reasoning? Public utilities, the sole business of which is to make power, do not figure fixed charges as high as the above table shows them to be. Here again we must ask: How far is the paper mill justified in spending money to prevent obsolescence in its power plant? The mill itself is in the business of making paper, not power. Even granting that in order to forestall obsolescence in the processes it must write off the process equipment rapidly, does it follow that this is true of the power plant? If a longer economic life is assumed for the power plant, say 10 or 15 years, comparable with the physical life of most of the power equipment, then the fixed charges are lower, the total cost of power plant service per pound of paper is lower, within certain limits and the management could afford to take a small amount of power plant obsolescence into account in return for the advantage of the lower fixed charges over a longer period.

Again, no answers to these questions are proposed here. The answers seem to depend partly on opinion, partly on company policy and partly on accounting practice. But the questions must be faced sooner or later, by every mill management, and answered one way or another. The reason for emphasizing them here is that technical developments in the power industry during the past ten years have occurred so rapidly that many power plants built only a few years ago are obsolete and cost so much to operate that complete rehabilitation is easily justified. Although just at present the power industry is engaged in catching up with itself, a number of new developments used by only a few plants may cause a repetition of the cycle within the next few years.

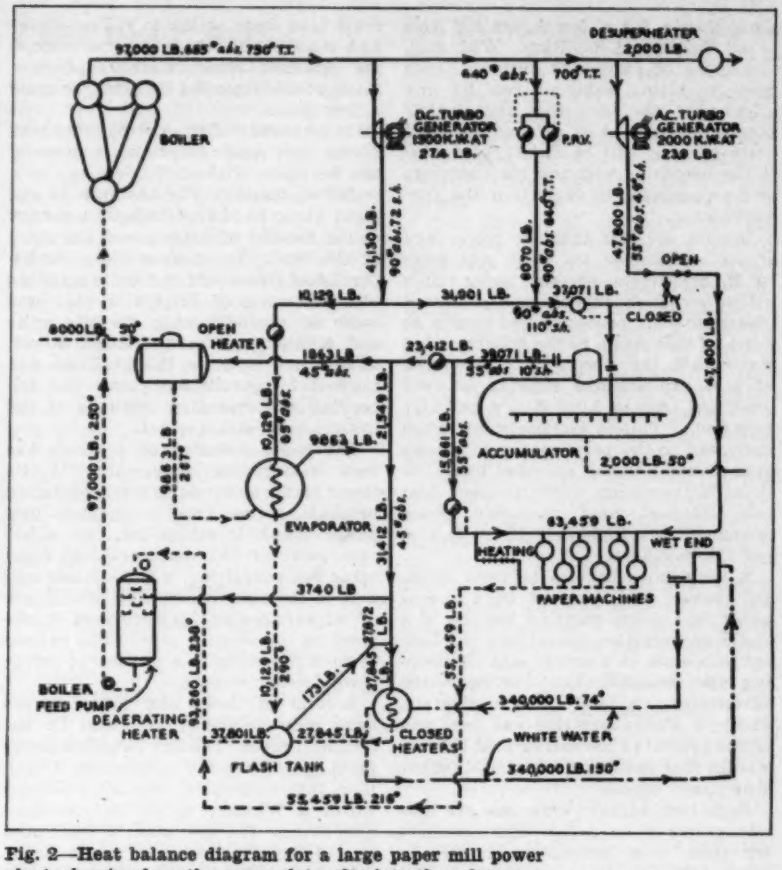

Fig. 2—Heat balance diagram for a large paper mill power plant, showing how the accumulator fits into the scheme

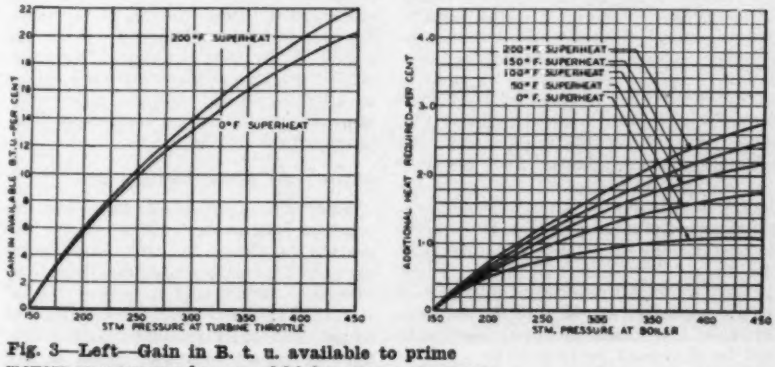

Fig. 3—Left—Gain in B. t. u. available to prime movers or processes by use of higher steam pressures. Right—Additional heat required by boilers for higher steam pressures. This is the additional amount of fuel that must be burned

Importance of Heat Balance Studies

In regard to the third item of power costs named above—low cost of power and steam services—volumes can be and have been written. It is obvious that the three items are so interdependent that they can scarcely be discussed one by one. But assuming that the mill management, looking at this subject of power costs, has some definite opinions or policies about reliability and obsolescence, what about the plant itself, as a physical entity?

Before much study can be made of power costs, it is assumed that the management realizes the vital importance of detailed heat balance studies of the plant. These are nothing more or less than statements in graphical or tabular form showing how much fuel energy is delivered to the power plant and how much of that energy is delivered to the mill in various forms such as electric power, heating steam, compressed air, hot water, mechanical energy.

The word balance is probably a misnomer because the heat balance study is really a budget statement. Too many mill executives hold the idea that there is in many paper mills a balance between the steam and electric power demands such that the prime movers act as reducing valves and the electric power they produce costs nothing. This is far from the truth. There may be times when the steam and power loads bal-

ance closely for a few hours but this is not the normal condition. With modern types of extraction turbines, very good operating balances can be produced, but the idea that the electric power is produced as a by-product and costs nothing will be quickly dispelled if the executive will ask his engineers and accountants to show him the true conditions.

Despite the fact that the power and steam balance, as we must still refer to it, is seldom perfect, paper mills utilize so much exhaust and extracted steam in their processes and return so much of this steam to the boilers as hot water that the electricity is produced at heat expenditures ranging between 5,000 and 7,000 or 8,000 B. t. u. per kilowatt-hour. This is extremely low when compared to the performance of a high grade central station operated by a public utility company, where the best heat rate obtained with up-to-date steam equipment is a little over 12,000 B. t. u. per kilowatt-hour.

A very close balance between steam and power was attained in a recent paper mill power plant by the use of a steam accumulator, permitting the boilers to operate at a steady rate of steaming and resulting in other operating advantages. A heat balance diagram, Figure 2, shows how this was done and also is typical of the sort of heat balance studies that should be made of all paper mill power plants.

Such heat balance diagrams are usually prepared by paper mill engineers for their own guidance. It will be noted that the progressive paper mill executive co-operates with the power engineer in his endeavors to get them. Proper instruments are needed for securing the necessary data on steam and water flow to the various machines and processes, electric power consumption and other items.

These progressive paper mill managements use the data their engineers collect. Not only that—they regard the power supply department as one of the most important in the plant and take pains to let the engineers realize it too. The result is that a constant check is kept on power costs and when the engineering department has ideas on the subject they are considered with the same attention as those coming from the papermakers.

After heat balance studies of a power plant have been made and the present condition of things determined, then the question is what to do about them, if anything. Here the mill management will have to trust the engineers for a great deal of the technique. A good consulting engineer will often lend an outside point of view to the analysis that will yield interesting results. But in any case, the plant's own engineer and the consulting engineer must cooperate well to insure satisfactory results. Usually they do.

Technique of Lowering Power Costs

When the management and the engineers have reached the point where they must take some action to reduce power and steam costs, three general courses are possible: revise methods of operation, rehabilitate the old plant, or build a new plant.

Careful study of an existing plant may reveal that some surprising economies can be made without buying any new major equipment. For example, in one plant using hand-fired boilers, a change in the method of firing saved one third of the fuel. In another plant, which purchased power and had units standing idle, a saving of $20,000 a year was made by reconditioning the idle units and eliminating the purchased power. In still another case, the total cost was reduced by purchasing power and improving the operating methods of the low-pressure steam plant.

The paper industry as a whole has been remarkably progressive in its power plants and usually a rehabilitation program, rather than a complete new power plant, is called for. In either case, however, the engineers, both operating and consulting, will doubtless suggest to the management the advantages of superimposing high-pressure equipment on the existing plant. The success of such programs in a number of recent plants merits attention.

Several of these new power plants have been described in detail in the technical press. The new Waldorf power plant operates at 650 lb. pressure, Champion International at 400 lb., Hollingsworth & Whitney at 450 lb., to name only three. The new plant of Champion Coated Paper Co. with its single 600-lb. steam generating unit serving a 20,000-kw. three-element turbo-generator is one of the outstanding power plants of the country.

Some of the gains that result from the use of high-pressure equipment are shown in Figure 3. The high pressure permits steam to be extracted and exhausted from steam turbines at pressures suitable for process work after having made a considerable amount of electric power.

One of the characteristics of old paper mill power plants is a large number of small boilers, often disposed about the plant in several boiler rooms. There may be also several engine rooms and the complication of piping and the losses in operation under such an arrangement are too great for any mill to sustain. One mill replaced 25 old boilers in three separate boiler houses by four modern units with a total capacity of over 5,000 boiler horsepower. This reduced the coal consumption 175 tons a day and eliminated 50 attendants. This is a typical example of how centralization of all power facilities often leads to economies.

Of course, the elimination of labor is something that all industry must take account of from now on. Until the paper industry can determine just how it will work under the N. I. R. A., the item of labor and wages in power costs cannot be discussed intelligently.

Among the plans for reducing costs of power and steam to paper mills is one proposed by V. D. Simons. He has worked out detailed designs for joint firm power plants to be built at large industries, financed largely by public utilities and supplying process heat and power to the industry, the heat being produced as a part of the power generating process and any excess power being absorbed by the public utility's transmission system. Power for the industry, according to Mr. Simons' calculations, could be produced at about 8,000 B. t. u. per kilowatt-hour. The investment of the industry in the power plant would be very small. It is understood that the Munising Paper Co. is operating under such an arrangement.

Unfortunately, schemes of this type have not found much support among the public utilities. They have on more than one occasion definitely stated their objection to building plants to supply a single industrial. Because of the importance to them of the diversity factor, they may be justified in this attitude. But in the writer's opinion the public utilities will be forced by business and social trends to modify greatly their attitude toward co-operation with industrial plants. One or two of the large utilities have already done so, with much financial profit, not to mention the betterment of their public relations.

Many paper mills have hydroelectric plants operating in parallel with their steam plants; the effect of this parallel operation on power costs is difficult to discuss in such a brief article.

Many of the developments in power generating equipment that affect power costs have been discussed in the article on remodeling previously referred to. Among them is the Diesel engine, about which industrial executives hear a great deal of talk. Now the Diesel engine has a large and rapidly growing field in the driving of generators and compressors and other equipment under conditions that do not require large quantities of process heat at the same time. For that reason it has not so far found wide acceptance in the paper industry. In some cases, however, in rehabilitation programs it might find use in adjusting the power and steam balance. A power plant serving a large stockyards district uses steam turbines and a Diesel engine as prime movers. A metal products plant in Connecticut has a rather ingenious layout which includes a Diesel, some steam prime movers driving generators and a connection with the utility for purchased power. Certainly, the Diesel has demonstrated its worth as a prime mover; for the paper mill, however, its use would be governed entirely by the heat balance.

Where's the Money Coming From?

Now, without question, those mill executives who have read thus far are saying, "All very fine, but how are we to find the money for all these fine schemes for lowering power costs? Right at the time when money is hard to get, you urge us to spend it on the hope of future savings." That is just what a large number of your competitors have done during the past three years.

To assist those industrialists who hesitate to invest working capital in

needed power plant construction, an interesting method of financing, as applied to the new power plant of a packing company, may point toward a solution of the problem. The plan is described in detail in the July, 1933, issue of *Power Plant Engineering*. Briefly, a certain company, formed to organize such service, arranges to underwrite the construction of the power plant on a lease basis. The plant is designed by an independent consulting engineer. The company then leases it, takes it over, operates it and pays all fuel, labor, repair, insurance and tax costs. Monthly lease payments are approximately equal to the former purchased power bills and at the end of the five-year lease period the plant has the option of buying the power plant for $25,000. The plan, it is stated, is entirely different from the guaranteed savings plan or the manufacturers' financing agreement.

In conclusion, it should be apparent that it has been possible in this article merely to indicate some of the details that management should scrutinize, with the help of its engineers, when it looks at power costs. The details are matters for joint conference of the production man, the engineer and the accountant.

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◆ THE YALE & TOWNE Manufacturing Co., with executive offices in the Chrysler Building, New York, announces the purchase of the real estate, machinery, tools, inventory, patents and goodwill of the Walker Vehicle Company and the Automatic Transportation Company, of Chicago, makers of industrial electric trucks and commercial electric street vehicles, which lines supplement and complement the extensive lines already manufactured by the company. The manufacture and sale of each company's products will be continued at 101 West 87th Street, Chicago, retaining the present personnel with F. H. Tinsley in charge.

◆ Mrs. Louis E. Wise

Friends and acquaintances of Dr. Louis E. Wise, Professor Emeritus of New York State College of Forestry, Syracuse, N. Y., and readers of THE PAPER INDUSTRY who enjoy reading his articles from time to time, will be grieved to learn of the passing of Mrs. Wise on August 14.

Since his retirement from active teaching at the College, Dr. Wise and his family have resided at Winter Park, Florida, where he enjoyed the beneficial effects of the southern climate. Mrs. Wise was a true helpmate, always giving first consideration to the Doctor's health and his work. She had been failing for some time, but characteristic of her unselfishness, had quietly carried on until a short time before her passing.

Dr. Wise has returned to New York to be with relatives, where it is hoped their kind sympathy may be a comfort to him and ease the shock of his bereavement.

◆ Forestry Night School at Conservation Camp

What is probably the first night school of forestry, given by a regular staff of forestry professors for members of the 1,650 C. C. C. Camps now in operation throughout the United States, was inaugurated last week at the New York State Ranger School at Wanakena, New York.

This new educational program is under the personal direction of Professor James F. Dubuar, Director of the State Ranger School, who is working in cooperation with Captain Brigham, the commanding officer of the Ranger School Camp located on the 2,300 acre Ranger School property of the New York State College of Forestry.

Enrollment for this night school course in forestry is entirely voluntary. Already more than thirty boys are taking the course and all of them appear to be enthusiastic about it. Classes meet every Tuesday and Thursday evening from seven to eight o'clock. Among the boys at the Ranger School Camp is a graduate of the Potsdam Normal School, one had three years at Syracuse University, another has completed two years at the New York State College of Forestry and a fourth is ready to enter a forestry school when his finances will permit.

Dean Samuel N. Spring of the New York State College of Forestry recently inspected the Ranger School Camp and the various forestry operations upon which the boys are now engaged. In reviewing the work he said: "The educational program developed by Director Dubuar and Captain Brigham has been a big factor in developing a fine spirit among the boys, who are doing splendid work in the forest. The night school aims to give the boys a general understanding of the field of forestry, orient them as to the purposes of forestry, and at the same time offers an opportunity to acquire useful information regarding the growing of forest trees, the protection of forests against fire, insects and disease, and also gives them a general understanding of the direct and indirect benefits of our forest resources."

◆ Paper Mills to Exhibit at D. M. A. A. Exposition

The Sixteenth annual international convention and exposition of the Direct Mail Advertising Association will be held at the Sherman Hotel, Chicago, September 26 to 29.

In several of the conferences, the subject of the use of better grades of paper will be discussed. The better appearance of printed advertising pieces for use in direct mail efforts is also being stressed because the leaders of the Chicago convention and exposition committee in charge of the program believe that the general public will respond more quickly to proposals that are attractively printed than to poorly printed pieces.

A large number of paper mills and merchants have taken booths.

This group shows about ninety-four paper merchants who distribute the Hammermill lines gathered at the Kahkwa Club, Erie, Pa., for the twenty-second annual conference of Hammermill agents which was held August 24 and 25. The meetings were presided over by E. R. Behrend, president of the Hammermill Paper Company. Among the speakers who addressed the meetings was Charles J. Babcock, vice president of Batten, Barton, Durstine & Osborn, Inc. Two agents, Messrs. R. P. Andrews and M. L. Kratz, have attended all of the twenty-two gatherings.

◆ Organization of National Container Association

The corrugated and solid fibre shipping container industry has been organized as the National Container Association, the membership of which consists of the members of fourteen (14) Regional Associations and embraces nearly 90 per cent in number and production of the entire industry.

The board of directors of the National Container Association is composed of 34 members, there being two from each Regional Association and six directors at large. The officers and committee as at present constituted are as follows: President and chairman of board of directors, Col. C. W. Gaylord of St. Louis; vice-president, Samuel Kipnis, Long Island City, N. Y.; business managers, Stevenson, Jordan & Harrison, New York and Chicago; executive committee, J. L. Barchard, J. B. Fenton, C. W. Gaylord, Irving Hill, H. C. Krannert and F. J. Kress.

The National Container Association will take over and carry forward the various activities of the heretofore existing fibre container trade associations. This service will henceforth be conducted by National Container Association in the interest of the entire corrugated and solid fibre container industry. The association will also serve as a contact medium between the container industry and the National Recovery Administration.

Offices will be maintained at New York and Chicago; the accounting, statistical and traffic service being conducted from the Chicago office.

This new organization has already enrolled in its membership the largest number and greatest percentage of total production of the industry that has ever been embraced in any association of corrugated and solid fibre box manufacturers.

◆ IT IS REPORTED that the Mead Paper Board Corp., Chillicothe, Ohio, is negotiating for the purchase of the Menasha Paper Corporation mill at Menasha, Wis. The Menasha plant manufactures strawboard and chipboard.

◆ WINTHROP W. ALDRICH was elected a director of the Westinghouse Electric and Manufacturing Company at a recent meeting of the board. In addition to the directorship, Mr. Aldrich is president and a director of the Chase National Bank, and a director of The American Telephone and Telegraph Company, American Express Company, Discount Corporation, Rockefeller Center, Inc., and other companies.

◆ THE GENERAL ELECTRIC Company and four of its associated companies have announced the removal of their offices in New York City to the new General Electric building, 570 Lexington avenue at 51st street. Included are the executive offices, New York district office, air conditioning department, electric refrigeration department, Atlantic division of the Incandescent Lamp Department, Merchandise Department and Plastics Department of the General Electric Company, and the General Electric Contracts Corporation, G. E. Employees Securities Corporation, General Electric Realty Corporation and International General Electric Company, Inc.

◆ Container Corporation Acquires Wabash Coating Mills

The Wabash Coating Mills, Wabash, Indiana, are now operating as the Wabash Coating Mills division of Container Corporation of America.

The entire sales personnel has been taken over, and, with other Container Corporation boxboard representatives, will handle the sale of Wabash products.

For more than 40 years, the Wabash Coating Mills have been outstanding producers of Clay Coated paperboards. The rigid quality standards will be adhered to, and extended.

Wabacoat Clay Coated Boxboards, Wabash Coated Blanks, Railroads, tag and check book cover stocks are among the products of this mill. Container Corporation now offer the most complete line of boxboards available in America.

◆ Combustion Engineering Reorganized

As of August 1, 1933, Combustion Engineering Company, Inc., a newly organized company, took over the properties of International Combustion Engineering Corporation and affiliated companies recently sold by order of the Federal Court. The properties acquired include those of Combustion Engineering Corporation, Hedges-Walsh-Weidner Company, Coshocton Iron Company and Raymond Bros. Impact Pulverizer Company. In order to assure the best possible service to the company's customers, these properties will be operated under a single centralized management.

The new company will continue Combustion Engineering Corporation's complete line of fuel burning, steam generating and related equipment which includes all types of stokers, pulverized fuel systems and boilers, as well as water-cooled furnaces, economizers, air preheaters, ash conveyors and hoppers.

The same engineering personnel and manufacturing facilities which have enabled the company to carry out these outstanding projects will be continued by the new organization. The company's principal lines of equipment will be available in a range of sizes adequate for plants ranging from about 50 boiler horsepower up to the largest built.

The officers of the new organization are: Frederic A. Schaff, president; Joseph V. Santry, executive vice-president; Robert M. Gates, vice-president in charge of sales; Martens H. Isenberg, vice-president in charge of production; John Van Brunt, vice-president in charge of engineering; Harold H. Berry, treasurer; George W. Grove, secretary and assistant treasurer; George D. Ellis, comptroller.

◆ New Catalogues and Publications

Farrel-Birmingham Co., Inc., Ansonia, Conn.—This company recently published a booklet entitled "A Key to Industrial Recovery," in which the economic justification for mechanization of industry is analyzed. It shows that the installation of improved machinery is in keeping with the spirit of the recovery program and benefits both employer and labor by permitting higher earnings to both. This booklet is the third of a series discussing topics of current interest to business men.

D. W. Haering & Co., Inc., Chicago—A 16-page booklet on water treating describes the application of H-O-H treatments to various water problems and explains in detail the cause and effect of many problems common to boiler and hot water equipment. There is practical information and scientific data of value to the plant engineer, chemist and maintenance man. Sent free upon request giving business connection.

Krebs Pigment & Color Corp., Newark, N. J.—"White Pigments for High Opacity Paper" is the title of a booklet just issued by this company. It describes the various white pigments produced by Krebs and the effects of their uses in relation to opacity along with their application to such specific purposes as the manufacture of paper stocks, waxing, catalogue, book, envelope and coated papers, and boxboards.

Montague Machine Co., Turners Falls, Mass.—A new bulletin covers this company's complete line of paper mill machinery. In addition to a listing of all machinery for pulp and paper mills, many interesting cases are given, showing actual results accomplished by certain well-known mills through modernization. Copies on request.

Morris Machine Works, Baldwinsville, N. Y.—A new bulletin on Side Suction Volute Pumps fully describes many recent improvements in the construction of these pumps, with sectional drawings of motor- and belt-driven horizontal designs, and also vertical designs for operation in wet pit and dry sump. Various types of drive are illustrated, and complete rating tables are given for pumps driven by belt, motor and steam engine. These pumps are suitable for handling clear water and abrasive or pulpy mixtures. They have many applications in industrial plants, chemical plants and pulp and paper mills. Copies upon request.

Riley Stoker Corp., Worcester, Mass.—A new catalogue is devoted to this company's new Jones Side Dump Stoker. Full information is given concerning the advantages of this new stoker and the details of its construction and operation. The catalogue has been carefully prepared, and is profusely illustrated both with half-tones and color plates.

Standard Fuel Engineering Co., Detroit—A complete description of each of this company's refractory products (now identified and sold under the name Zero) is contained in a two-color folder recently issued. There is also general information of a technical nature on where and how to use these products, which is of interest to anyone who uses refractory materials in the field of high temperatures. Copies on request.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—A four-page leaflet describing a new complete line of splash and drip proof motors and control for every machine requirement, has just been issued by this company. This complete line of equipment is especially suited to the requirements of machines where splashing occurs. This equipment is claimed to be ideal for use in paper mills and boiler rooms wherever water should be guarded against for the most dependable and economical operation of electrical equipment. Copies of this leaflet, No. 20584, may be obtained from the company's advertising department, East Pittsburgh.

◆ The Lucky Fifty Thousandth

On August 19 the fifty thousandth signature was placed on the mile-long roll of paper in The Paper Foundation's co-operative paper exhibit at A Century of Progress Exposition.

This roll, when filled with signatures, will be forwarded to congress as a petition for 2-cent postage.

The signing of the fifty thousandth name to this petition was attended by appropriate ceremonies. Miss Betty Brown, daughter of the Mayor of Deland, Florida, was the honored signer. To mark the occasion, Phil A. Howard, president of The Paper Foundation, presented to Miss Brown a beautiful box of stationery and a large bouquet of Dennison-made paper flowers. The stationery was given by the Hawthorne Paper Co., Kalamazoo, Mich., manufacturer of Uncle Sam Bond, the paper being used for this petition.

August 19 was not one of the big days at the World's Fair, yet by actual count, 9,195 people entered the Paper Exhibit, which brings the total attendance to date above 450,000. There are ten big weeks before closing, which will undoubtedly bring the attendance to a million before the end of the fair November 1.

The officers of The Paper Foundation are jubilant over the success of this co-operative paper exhibit, which is proving the greatest medium for nation-wide publicity the paper trade has ever sponsored.

◆ AFTER 34 years of service, William Glennon, credit manager of the Robert Gair Company, Inc., retired on August 1. The occasion was marked by a luncheon in Mr. Glennon's honor at the Advertising Club of New York, at which Wilbur F. Howell, secretary of the company, was host. On behalf of the Gair Company, Ernest Meyer, treasurer, presented Mr. Glennon with a platinum and gold watch chain. C. R. Bradley succeeds Mr. Glennon as credit manager.

◆ Jeffrey Acquires Traylor Vibrator Company

The entire patent, manufacturing and selling rights for all devices heretofore manufactured and sold by the Traylor Vibrator Company of Denver, Colorado, have been acquired by The Jeffrey Manufacturing Company, Columbus, Ohio.

The Denver plant of the Traylor Company has ceased to manufacture equipment. Hereafter the business will be conducted as the Jeffrey-Traylor Division of The Jeffrey Manufacturing Company in Columbus, Ohio, where both mechanical and electrical parts of Jeffrey-Traylor units will be manufactured. Future inquiries and orders will be handled from Columbus.

James A. Flint, formerly vice president of the Traylor Vibrator Company, will be in general charge of the new division. The future development and application of the Traylor units of screens, conveyors, dryers, coolers and feeders, will receive the full attention of Traylor engineers combined with the extensive engineering, development, research and manufacturng facilities of The Jeffrey Manufacturing Company.

◆ Southern Alkali Plant Near Completion

After substantial expenditures on properties and construction during the last two years, work is being actively pushed to complete the alkali plant at Corpus Christi, Texas, the joint project of the Pittsburgh Plate Glass Company and the American Cyanamid Company.

This part of the chemical program, contemplated by the two companies for Corpus Christi, will represent an investment of several million dollars. These capital requirements are being financed by the Pittsburgh Plate Glass Company and the American Cyanamid Company out of their cash resources, and the transaction does not involve the issuance of securities to the public.

The Southern Alkali Corporation, which was organized in 1931, is building and will operate this plant. The stock of the Company is owned jointly by Pittsburgh Plate Glass and American Cyanamid. Hugh A. Galt, President of the Columbia Alkali Corporation, Barberton, Ohio, and a director of the Pittsburgh Plate Glass Company, is the president of the Southern Alkali Corporation.

In an announcement issued by Mr. Galt, he stated that the activity resulting from this development will help to support the program of the President and the Administration to create new jobs and thus put men back to work and decrease unemployment. This construction will give work to large numbers of engineers, contractors, skilled and unskilled labor—not only at the plant in Corpus Christi, but also at the steel mills and at the other factories which will manufacture the material and equipment.

This new plant will manufacture basic alkalis used extensively in glass, soap, oil refining, chemical and other industrial fields. Present plants making soda ash and caustic soda are all located in the North and away from tidewater. The products are heavy and bulky. Freight is a matter of serious importance.

◆ Wm. T. Conlon With Superheater Company

The Superheater Company, New York, has appointed William T. Conlon, manager of its Industrial Department. In this capacity, Mr. Conlon will have charge of the design, manufacture and sale of Elesco superheaters for all types and makes of boilers for public utility and industrial power plants. The products of this department also include desuperheaters, resuperheaters, furnace water walls and miscellaneous heat exchange apparatus for power plants and process industries.

Since November, 1929, Mr. Conlon has been serving in an executive sales capacity. Prior to joining the Superheater Company, he was associated with Utica Gas and Electric Company.

◆ THE FALL MEETING of the Northwestern Division of the American Pulp and Paper Mill Supts. Association will be held at Rhinelander, Wis., September 15 and 16. F. J. Timmerman of the Northern Paper Mills, Green Bay, Wis., is chairman of the division, and the committee in charge of arrangements is composed of G. H. Suhs, Louis Dozier and Andreas Christensen, of the Rhinelander Paper Co.

◆ Textbook Sales Holding Up

Sales of the Textbooks upon Pulp & Paper Manufacture held up remarkably well during the depression, according to a report by the McGraw-Hill Book Company to the Textbook Committee.

For the six months ending December 31 last, a total of 147 copies of the five volumes were sold, while for the six months ending June 30, 1933, sales totaled 168 copies. It is particularly encouraging to note that during the recent six months' period 61 copies of Volume IV were purchased by students of the industry and that another printing of it will be required in the near future. This is the volume which deals in detail with the preparation of rag and other fibers, treatment of waste papers, beating, refining, loading, sizing, coloring, etc., in addition to general mill equipment.

The first book of the series was published in February, 1921, and total sales to date have amounted to 23,741 copies distributed as follows:

Vol. I	4,123
" II	3,377
" III	6,494
" IV	5,383
" V	4,364

The Textbook Committee receives standard royalties from the publishers on all sales, which constitute a permanent and adequate fund with which to finance the necessary revisions from time to time in order to keep the Textbooks abreast of a constantly developing industry.

◆ Patent Awarded to Folke Becker

Mr. Folke Becker, manager and treasurer of the Rhinelander Paper Company, has just been issued a patent on a method of manufacturing paper by the United States Patent Office.

Mr. Becker's patent covers the method of mottling paper, which in the finished form makes it very adaptable for greeting card purposes.

Considerable tonnage has already been produced in this new grade of paper at the mills of the Rhinelander Paper Company, Rhinelander, Wis., and indications point to an increased demand throughout the greeting card field.

This mottled parchment is being sold to the trade by the Rhinelander Paper Company under the name of Leopard Parchment.

◆ The Currier Size Tester

The Currier Size Tester, designed to permit accurate and speedy determinations of the degree of sizing of any paper, is essentially a device that indicates by means of a meter the completion of an electric circuit through a sample of paper wetted from one side until the wetness penetrates the sample and conducts the electric current through it. The elapsed time, as measured by a stop watch or clock, between the moment that the wetting medium touches the paper sample and the time when the end

point is reached, indicates the degree of sizing or resistance to moisture penetration.

Distilled water is commonly used as the wetting medium, although for special problems of liquid resistance to papers the liquid in question in most cases may be used in the instrument in place of the water.

The water or other liquid is applied to the sample by a circular felt of approximately one square inch in area, which is supported over the mouth of an inverted bottle containing the liquid. The liquid passing through orifices of a specially constructed bottle cap keeps the felt saturated.

No appreciable head or pressure is delivered to the sample since the bottle, except for the felt area at the mouth, is air-tight. Variation in water level within the bottle, therefore, would have no effect on the test.

The sample being tested is placed on a normally dry, horizontal metal plate, which is so located in relation to the inverted bottle and its mounting that contact with the upper surface of the paper by the felt is assured. The felt and plate are electrically connected to the indicating circuit. Provision is also made for keeping the plate at a certain constant temperature at which tests have shown that rather wide variations in humidity and temperature have little effect on the rate of penetration. A thermo-regulator installed within the instrument automatically controls the temperature of the heating element which in turn receives its supply from a 40-watt illuminating bulb.

The instrument contains two electric battery circuits, either of which is available at the turn of a switch, to make it applicable to all classes of papers. One circuit is used to measure the size resistance of very thin papers which are practically water-leaf, while the other circuit is used for all other papers of any thickness and degree of sizing. The first circuit is marked *Slack-Sized;* the second, *Hard-Sized.* These circuits greatly amplify the infinitesimal current passage through the wetted sheet and make unnecessary the use of an electrolyte.

The meter, which indicates the end point for any test, serves as a convenient means for calibrating the instrument. Full scale deflection on the meter between the in and out contact positions of the felt with the metal plate indicates that the apparatus is in calibration. The only adjustment which may be occasionally necesary is a rheostat which is self-indicating at the start of every test. The batteries, furnishing the current for the electrical circuits and installed within the instrument cabinet, will function for at least a year with ten hours of use per day.

While most papers are naturally nonconductors of electricity, some papers such as carbon or oxide colored papers, are found to be conductors when dry. In testing such papers, an insulating grid of microscopic lens paper (Mitsumata paper) is placed between the sample and the plate, and then the test conducted as usual.

When a test has been completed, it is simply necessary to raise the bottle, remove the sample, and wipe the plate dry with a blotter. The instrument is then ready for another determination.

More detailed information concerning the Currier Size Tester may be obtained from the manufacturer, The Sorg Paper Co., Middletown, Ohio.

◆ Improvements in Eye Protection

The Linde Air Products Co., 30 East 42d Street, New York City, has just announced the new Oxweld No. 15 welding spectacles which are equipped with lenses made from a new lens designated as Type AA.

The lenses are mounted in a natural canvas-bakelite frame and are 50 mm. in diameter. They are flat-ground and polished and may be obtained in light, medium and dark green shades. This Type AA lens is claimed to have high protective qualities, and that its transmission percentages meet most rigid specifications for eye protection.

An insulating material is used to cover the bows or temples, which, by means of a snap device where they meet the frame, permit the frame to be spread and lenses changed in a few seconds.

◆ New Waterproofing Products

Two waterproofing products, one designated as Omicron 4-in-1 and the other as Stearox 30, have been recently developed by The Master Builders Co., Cleveland, Ohio.

Omicron 4-in-1 in liquid form is added to mortar in the proportion of one quart per sack of cement. It is highly reactive with the free lime released when the cement hydrates, and converts it into a cementitious material which adds strength and resistance to corrosion. The plasticizing effect obtained is said to be due to the gelatinous properties of the product which contributes notable lubrication while increasing the adhesive quality of the mortar.

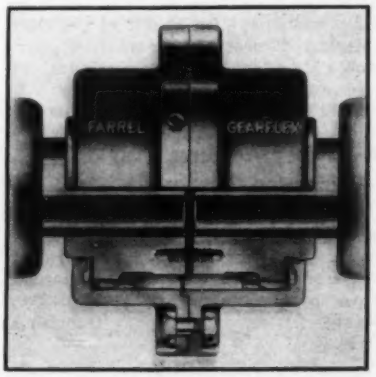
Stearox is the resultant of what is claimed to be an improved method of processing stearic acid waterproofing paste. This product contains, according to the manufacturers, two and one-half times the amount of stearate that has been supplied by conventional waterproofing pastes for the past several years. A further improvement effected in this product is the elimination of ammonia, and of mineral salts that have been employed heretofore in manufacturing stearate pastes by the old process.

◆ Farrel Gearflex Couplings

A new flexible coupling known as the Farrel Gearflex has recently been introduced by the Farrel-Birmingham Company, Inc., Buffalo, N. Y. It is made in two types; namely double engagement and single engagement.

The double engagement type consists essentially of two externally geared hubs keyed to the two shafts to be connected and engaging an internally geared floating sleeve which encases the two hubs. With two sets of spur gears, one at each end of the floating sleeve, misalignment is compensated for by the sleeve assuming a neutral position between the two shafts.

A large reservoir between the hubs and the floating sleeve carries a supply of lubricant. When the coupling rotates, centrifugal force throws the oil to the inner surface of the floating sleeve



where it spreads between the gear teeth, entirely immersing the load-carrying surfaces in a bath of oil. The load is carried by the oil film with no metal-to-metal contact between the teeth, thus providing a cushioning effect which gives a high degree of quietness in operation and reduces wear to a minimum.

The accompanying illustration shows a cutaway view of a double engagement type coupling.

The single engagement type has only one externally geared hub in engage-

ment with an internal gear in the sleeve, the other hub being solid and the sleeve bolted to it. It is designed to provide a lower cost coupling for applications where the high speed capacity and the high degree of flexibility of the double engagement type is not required.

Both types are available in a number of standard sizes and power ratings.

◆ Rectangular Switchboard Instruments

Among several points of advantage claimed for a new line of rectangular switchboard instruments, announced by the General Electric Company, is the fact that the scale can be read at an angle with no error of parallax. Anti-glare glass is another special feature. Others are magnetic damping, high torque, responsiveness, permanently constant characteristics and availability in three styles of cases.

The line, designated as Types AD-6 and DD-6, include alternating current voltmeters, ammeters, wattmeters, power-factor meters and frequency meters, and direct-current ammeters and voltmeters. Special instruments also available include temperature meters and radio-frequency and rectifier-type instruments. Both surface and flush type cases are supplied. The surface type instruments are 6 inches high and 5½ inches wide, and four instruments may be mounted on a 24-inch panel; the flush type instruments are 7 inches high and 6½ inches wide. In addition, three-element ammeters and voltmeters, 12 inches high and 5½ inches wide, are available.

The instruments are of the type used by power and industrial manufacturing plants.

◆ New Compressor Announced

A new, single-stage, belt-driven compressor, designated as Class "ES" and designed for heavy-duty service, has been announced by Ingersoll-Rand Company, 11 Broadway, New York. It has one horizontal, double-acting cylinder and operates at moderate speeds. It is available in sizes from 10 to 25 hp., and for discharge pressures from 5 to 150 pounds.

The machine is claimed to be suitable wherever full-load, continuous service is required and wherever power cost is an important consideration.

Complete details regarding the new compressor may be obtained from any office of the company.

◆ Additions to Beaver Line

Several recent developments have been announced by The Borden Co., Warren, Ohio. They include the Beaver power adapter, No. 12-R Beaver ratchet and No. 100 tubing cutter.

The power adapter, designed to cut either right or left hand threads and reversible for backing off, utilizes any standard make of electric or air drill as its source of power. With the average ½-inch Special electric drill one can thread all sizes of pipe up to 2 inches with the adapter. A ⅝-inch heavy-duty drill has sufficient power to drive geared tools for cutting and threading pipe up to 6 inches.

A driving spud to fit all standard drill chucks is furnished with each adapter.

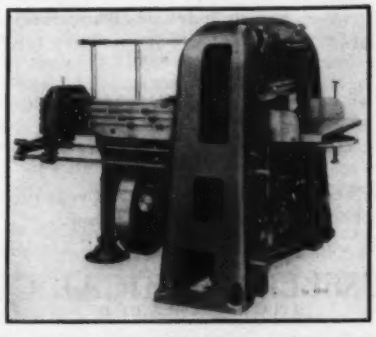
The No. 12-R Beaver ratchet is a self-contained die stock which permits adjustment of the dies for over, under or standard threads of full length. The ratchet drive ring is on the die head. This design is said to insure smooth operation, good threads and easy pulling. The dies, being on top, can be easily oiled and provide instant chip clearance.

A self-contained rear end permits the pipe being threaded to be centered accurately.

The tubing cutter is a handy little wheel cutter for cutting ⅛ to ¾-inch sizes of copper tubing. It is claimed to produce clean, square ends without crushing.

◆ Seybold Quick-Space Cutter & Trimmer

A new and improved cutter and trimmer, known as Quick-Space, has just been announced by Seybold Machine Company Division of Harris-Seybold-Potter Company, Dayton, Ohio. It is a one-man machine and does not require the attendance of an assistant or a second operator at the rear. The machine is loaded from the front and the work



is fed back to the operator quickly and accurately by means of the Quick-Space.

At the side of the cutter & trimmer is mounted a gauge board equipped with several rows of adjustable stops. These stops may be set quickly and directly from fixed scales to give any desired sequence of spacing from zero to the size of the machine. A traveling carriage containing automatically controlled plunger stop pins is rigidly attached to the back gauge and the whole easily moved by a conveniently located quick acting handwheel. The entire gauging mechanism is mounted on roller bearings so that it has a remarkably easy movement.

The knife action automatically indexes the Quick-Space so as to place the next succeeding stop in position. The operation of the machine is simply that of throwing in the cutting mechanism as in an ordinary cutter and then pulling the back gauge up to the next stop or cutting position. It is not necessary for the operator to read the tape, thus eliminating the element of human error.

The Quick-Space Cutter & Trimmer is readily convertible to and has all the features and uses of a standard cutter. A simple twist of a small lever places the spacing mechanism out of operation so that set-up runs may be interrupted for general cutting work and then resumed without the necessity of resetting the job.

Other features are: foot treadle clamp movement, automatic clamping, three-piece fingered back gauge, steel indication tape for use in general cutting work, safety washer drive, and non-repeat device. The starting lever is of the one-hand two-motion type making for increased safety on the part of the operator. A shielded light is provided for illuminating the scale and the working portion of the table immediately below the knife and clamp. The entire mechanism of the machine is fully enclosed within the massive one-piece frame, yet all parts are readily accessible.

The entire machine is of unusually rigid construction—smooth and quiet in operation. It is fast and remarkably simple and easy to operate.

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◆ Research on Calgonizing

The Buromin Company of Pittsburgh, Pa., which has made wide application of molecularly dehydrated phosphates of the alkali metals in water conditioning and washing, has founded an Industrial Fellowship at Mellon Institute for the purpose of investigating broadly the properties of these chemicals and of extending their uses. Special attention will be accorded to Calgon, which is essentially sodium metaphosphate.

Dr. Bernard H. Gilmore, who has been selected as the incumbent of this Fellowship, started his research program on June 15. The field of uses for molecularly dehydrated phosphates in the textile and paper industries will soon be explored. It appears that these chemicals are of special value for dissolving residual calcium soaps and similar compounds as well as for water-softening purposes. It is planned to publish the findings as the researches progress.

◆ A MODIFIED procedure for testing water resistance of paper products is suggested by the Bureau of Standards for its dry-indicator test for water resistance of paper products when used in testing very resistant products, such as fiber boards and waterproofed papers. The dry-indicator method consists in sprinkling a mixture of sugar and water-soluble dye on one side of the test specimen and applying water to the opposite side. The time required for the water to penetrate through the specimen, which is indicated by development of the dye color, is the measure of water resistance. In testing very resistant products, it is necessary because of the slow permeation of moisture, to have means of retaining the transuded moisture on the surface of the paper until it becomes sufficiently condensed to effect the indicator.

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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Operating Instructions for Chain Grates

Be sure and keep the feed gate properly adjusted to obtain a uniform fuel bed; also keep the feed gate tile in line, and insert new tile when the old ones get broken down, as an uneven fuel bed may cause holes to be blown in the fire and reduce the furnace efficiency.

Operate the stoker so that combustion is complete and the carbon well burnt out before reaching the rear end. If the fire tends to pass over at the rear into the ashpit, the speed of the stoker should be decreased and the thickness of the fuel bed lessened or the draft increased. These three conditions must be regulated according to the quality of the fuel being burned, the combustion rate desired and the draft available.

Make frequent analyses of the flue gas, or if possible have a recording instrument on each boiler. A little time spent in experimenting to determine the proper relation between the thickness of the fuel bed and the speed of the grate that gives the best results will be well worth while.

Do not let the fire draw away from the gate; if it tends to do this, decrease the speed of the grate and increase the thickness of the fuel bed and regulate the draft accordingly.

Do not entirely close the dampers with a hot fire on the grates; always keep a slight draft above the fire.

Do not stop the stoker for any length of time with the hopper full of coal, as it will burn forward into the hopper and is liable to injure the gate.

See that the grate is kept at the proper tension by adjusting the tension at the rear of the grate. To do this, draw up on the bolts until the chain is tight, then slacken off a slight amount. The chain is too loose when the grate sections dip down below the horizontal on coming over the top of the front sprocket.

Keep the ledge plates adjusted to reduce the air leakage along the side of the grate.

A brass-polishing paste, said to give satisfactory results, is composed of camphor gum, 1 oz.; alcohol, 2 oz.; spirits of ammonia, 2 oz.; spirits of turpentine, 4 oz.; candle paraffin, 1 lb.; clean tallow, 1 lb.; tripoli, 1 lb. For compounding, first dissolve the camphor in the alcohol, then melt down the tallow and paraffin and stir in the liquids and the tripoli. Before cooling the paste can be packed in boxes of sizes convenient for use.

Coal ash contains silica, alumina, iron pyrites and other mineral matter. Depending upon the chemical composition and physical condition, these cause the ash to fuse more or less easily. The temperature at which firebrick will melt is sometimes influenced by the composition of the ash. For instance, a certain ash might melt at 2,600 deg. Fahr. and a certain firebrick at 2,800 deg. Fahr., but together in a furnace where the ash and the brick make contact, both might melt at 2,500 deg. Fahr.

◆ Pipe Connections to Steam Pumps

Direct-acting steam pumps take steam nearly full stroke, so that there is no necessity to provide receiver space in the branch, and if taken from the top of a properly drained main, no drip connections to the branch will be necessary. When the pump is located nearly under the main, the branch will need no additional support, but should have a stop valve at the main and a throttle valve at the pump. The stop valve is convenient when necessary to repair the throttle valve, which is subject to considerable wear, due to being kept partially open a great part of the time. A scheme resorted to occasionally to prevent excessive wear of the throttle valve is to provide a by-pass with a valve one-fourth the size of the throttle. This valve is used to regulate the pump and naturally takes the wear, but being smaller than the throttle will be opened wider, hence cutting of the seat will not be so great and when worn it is replaced at less expense.

In steam leads to pumps provided with governors, the governor should have a by-pass pipe and valve and in the governor branch there should be a valve on each side of the governor to insure continuous running of the pump in case the governor needs repairs.

Exhaust from steam pumps is generally used for heating purposes and when it is delivered to a main serving a number of pumps or other equipment each individual exhaust connection should be provided with a valve so that any pump may be removed or repaired without interference with other equipment.

Each suction and discharge water connection should be provided with a valve close to the pump. Air heads in suction piping may also be used to advantage on the discharge connection of some reciprocating pumps to give steadier flow and prevent hammering if the pump itself is not provided with an air chamber for this purpose.

In starting up a pump which has been idle for some time, there will almost always be air in the suction line, and pumping out may become a tedious process. To avoid this, provision should be made to discharge the air from between the valve decks by a short pipe and valve located at about ¼ in. below the discharge valve deck; where there is a long lift, and if a centrifugal pump is employed, provision should be made for priming the pump with water before starting, and a foot valve should be used on the inlet pipe. If water cannot be suplied for priming, the air may be exhausted from the pump by a steam ejector.

◆ Acidulous Oil and Its Cause

In compounded oils there will be found more or less fatty acids. These are not active in attacking metal and so are harmless in this respect. They, however, do increase the tendency to form emulsions if water is present. In addition, in the presence of a small amount of moisture, they may cause corrosion.

Greases, such as used to lubricate bearings will almost always show some degree of acidity. No corrosion will occur unless moisture has been present. It should be understood that fatty acids never are as dangerous as mineral acids.

In the refining of lubricating oils the oil is washed with sulphuric acid. The oil is then treated with an alkali to neutralize the acid, and then washed with water to remove the alkali. It is very seldom if ever that an oil put out by a reputable refiner carries any mineral acids.

Some engineers use the litmus paper test to detect the presence of fatty acids. This is not always an indication since the acids that may exist may not be soluble in water, and solubility is necessary to obtain the reaction on the litmus paper. Or the water used in the the acid in the solutions.

If a small amount of the oil be placed upon a piece of bright brass the acid will etch it in about thirty-six hours.

◆ EXPERIENCE has shown that the loss occasioned by excess air rushing in at the rear of a chain-grate stoker when that part of the fuel bed is kept thin to burn out the last trace of combustible in the ash is greater than the gain made by burning the combustible. A coal high in ash, therefore, is well suited to this type of stoker.

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Whether or not you are equipped to grind your own Rolls—it is important that you keep a "close check" on them. Only Calender Rolls of accurate shape and with good smooth surfaces assure Uniform Quality Paper and consistent trouble-free production.

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Write for Literature

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Variety of Subjects on Safety Congress Program

What has the paper and pulp industry accomplished during the past year in the control of accidents? What are the most important present-day accident hazards? What are individual companies doing to control these hazards; and what can the industry do, co-operatively, during the coming year in national accident prevention?

These are questions which leading paper and pulp company executives will discuss at the sessions of the Paper and Pulp Section of the National Safety Council, as a part of the twenty-second annual Safety Congress and Exposition to be held at the Stevens Hotel in Chicago from October 2 to 6. The general chairman of these sessions will be J. J. Pizak of the Consolidated Water Power and Paper Company; and the secretary will be H. D. Banta of Hoberg Paper & Fibre Company. The 1932 safety progress of the paper and pulp industry was quite favorable as to *frequency* of accidents, as indicated by the accident experience of 241 industrial units, with an average of 63,000 employees, which reported to the National Safety Council. But the progress was less favorable as to *severity* of accidents.

Since 1926, the group of paper and pulp mills which have been reporting to the Council have reduced their average accident frequency rate by about 60 per cent, and their accident severity rate by about 43 per cent. Among the four different groups of the industry, the best accident frequency rates are reported by the re-manufacturing group and paper mills; and accidents are nearly twice as frequent in the other two groups—board mills and pulp mills. There is the same relationship among these groups in accident severity rates; but with still greater differences. For example, the accident severity rate of the re-manufacturing group is only one-half as great as the rate for board mills; and less than one-fourth the rate for pulp mills.

There also is a wide diversity in the rates of different mills in the same group. For example, among large newsprint mills, accident frequency rates (number of disabling injuries per one million man hours of exposure) vary from nothing to over 50.00; and accident severity rates (number of days lost per one thousand man hours of exposure) vary from nothing to over 11.00.

At the first program sessions of the Paper and Pulp Section, on Monday afternoon, October 2, J. J. Pizak, general chairman, will review "Past, Present and Future of the Paper Industry." Mr. A. Scott Dowd of THE PAPER INDUSTRY magazine, and chairman of the contest committee of the Paper and Pulp Section, will present "Data on the 1932-33 Safety Contest." Awards of National Safety Trophies will be presented by an officer of the National Safety Council; and awards of THE PAPER INDUSTRY Trophies by E. B. Fritz, publisher of THE PAPER INDUSTRY magazine. There also will be "Election of Officers"; and a general round table discussion on "Safety and Personnel Problems Peculiar to the Industry."

At the Tuesday morning sessions, there will be three twenty-minute talks, with general discussions, on the general problem of "Nip Hazards." The sub-topics are: "In Finishing Rooms," by George J. Adams, industrial supervisor of International Paper Company; "In Tissue Converting Plants," by H. D. Banta, assistant superintendent, Hoberg Paper & Fibre Company; "In Board Mills," by R. O. Dickinson, employment manager, Cornell Wood Products Co. W. J. Brennan, safety engineer, Maine Department of Labor and Industry, will discuss "New Lessons Learned from Old Causes of Injury."

The Thursday morning session will include the following program: "Safe Practices for Maintenance and Repairmen in the Paper Industry," by C. K. Boyer, mill manager, Consolidated Water Power and Paper Company; and "Experience Exchange" from the viewpoint of "Reaching the New Employees," "Testing, Care and Use of Rubber Protective Equipment," "Are We Making Most of Our 'News Letter'?"

The annual Safety Congress as a whole will have many special features. Supplementing the special sessions for each industry, there will be ten general "Subject Sessions" for all Congress delegates. The speakers will be experts in their respective fields. The "Subject Sessions," and the topics to be considered, are as follows:

"I DON'T BUY PIPE BUT I KNOW PIPE"

A VETERAN pipe fitter was talking, a man who had put in thousands of feet of pipe in his time . . . All kinds, too. "I don't buy pipe 'round here," he commented, "but I know real pipe when I run it, and this Armco Spiral Welded Pipe is just that. Handles as easy as a sapling, goes in fast and accurate and makes the strongest, neatest-looking job you ever saw. And inside Armco Pipe is as slick as a whistle—makes friction losses look sick. Custom-made for us paper men, that's what it is, all right."

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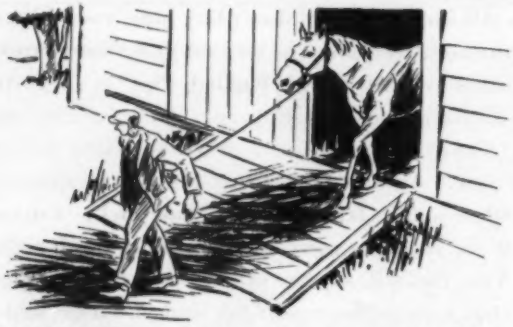

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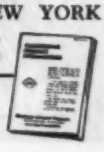

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Lessons in Paper Making

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One of the greatest funds of information on paper making ever published for the mill man.

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1—Accident Records: How to Collect and Tabulate Them; How to Analyze and Use Them.

2—Hoisting Chains: The Causes of Chain Failure; Inspection of Hoisting Chains; Repairing, Annealing and Normalizing Hoisting Chains.

3—Safe Use of Chemicals in Industry: Safety in Chemical Laboratories; Safe Handling of Acids and Caustics (small quantities); Safe Handling of Acids (large quantities).

4—Handling Materials: Handling Materials by Hand; Conveyors—Their Safe Installation, Use and Maintenance; Industrial Truck and Tractor Accidents and Their Elimination.

5—Safety Organization and Program: Education; Mechanical Safeguards and Engineering Revision; Supervision.

6—Safe Use of Electricity in Industry: Portable Electrical Equipment; Safety Switches—Their Application, Operation and Maintenance; The Use of Low Voltage in Hazardous Locations; The Physiological Effects of Electric Shock.

7—Falls of Persons: Ladder Accidents and Their Prevention; Safe Walkway Surfaces—Their Application and Maintenance; Stair and Ramp Accidents and Their Prevention.

8—Dust Problem in Industry: The Mechanical Control of Dust; How to Determine the Dust Content of the Atmosphere in Dusty Industries (a laboratory demonstration).

9—Maintaining Interest in Safety: Safety Contests; Investigation of Accidents; Foreman's Training in Accident Prevention.

10—Fire Prevention: How to Have a Fire in Industry; Safe Storage and Use of Flammable Liquids (large quantities); the Hazard of Defective Fuses and Extension Cords.

There also will be three additional "Subject Sessions" sponsored by the Industrial Health Section, as follows:

1—Dermatitis: Oil Dermatitis; other Skin Affections.

2—A Practical Medical Program for Industry: Health Education; the Placement of Workers from a Physical Standpoint; Practical Firt Aid and Its Relation to Accident Prevention (a demonstration).

3—The Eye and Its Relation to Safety: Principles Underlying the Practice of Eye Protection; How to Prevent Eye Injuries; Proper Lighting Related to Safety.

Another Congress feature of general interest will be the four early morning classes in Practical Psychology, on the subject "Mental Training for Safety," conducted by Dr. Harold S. Hulbert, a national authority in this field.

The Accident Prevention Equipment Manufacturers' section will have a special session on "Safety Equipment." The important problem of motor vehicle safety, since many industrial plants have motor fleets, will be considered in the sessions of the Delivery, Taxicab and Bus Section, and the Street and Highway Traffic Section.

There will be a permanent exhibit, at the Stevens Hotel, of modern equipment for the promotion of safety and health in industry and in public places. This will include mechanical safety devices, protective clothing, modern first-aid kits and hospital accessories, and motor car control equipment.

The Congress sessions have been so planned that delegates also will have opportunity to visit A Century of Progress, not far from the Stevens Hotel. In the Social Science building on the Exposition grounds there is a permanent safety exhibit by the National Safety Council, in co-operation with the City of Evanston. Another permanent safety exhibit is the Rescue Car of the U. S. Bureau of Mines, near the Travel and Transport building.

The purpose of the annual safety Congress is the advancement of practical safety methods adaptable to the present-day industrial revival.

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◆ THE FEDERAL SPECIFICATIONS Board has completed a purchase specification for paper towels. The test requirements are simply tensile strength and absorptiveness. The test for absorptiveness is made after the towels are heated for one hour at 100 deg. C., which is a means of accelerating any decrease in absorptiveness that may take place with normal aging. The Government found that occasional deliveries of towels became hard and water resistant after being stored for several months, and the Bureau of Standards was asked to investigate and recommend a test that would foretell any tendency of this kind.

The skeleton in the plant

COMPLACENCY and contentment, timidity and lethargy—these are the bones of the skeleton in the plant.

"Business in the main is highly competitive. Those organizations are most likely to succeed which face this fact boldly, and strive constantly for lower production costs by insisting that every executive keep his mind open to new ideas. These new ideas may bear on product, customer relationship, factory layout, methods of production, intensive research . . . or scientifically developed equipment.

"There must be alertness throughout the organization . . . to social and economic change . . . to possibilities for improvement in plant operation.

"There is no escape for operating executives from these fundamental realities." (*Editorial*—"Factory and Ind. Mgt.")

—and a visit to the coming Exposition of Chemical Industries is this year's outstanding opportunity to absorb the essential ideas without which no business, no individual, can hope to progress from now on.

Remember the place---Remember the date

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Dries by evaporation in a few minutes, can be applied over damp surfaces and becomes very glossy when dry.

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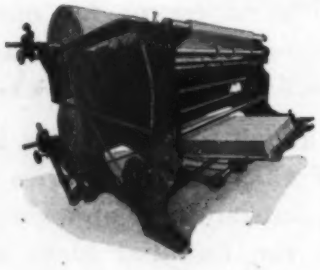

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Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Hollingsworth & Whitney Co.	Algonquin & Taconnet	Winslow, Me.
	International Paper Co.	Otis	Chisholm, Me.
	Bird & Son, Inc.	East Walpole	Massachusetts
	The Champion Coated Paper Co.	No. 2	Hamilton, Ohio
GROUP B	Champion Coated Paper Co.	No. 1	Hamilton, Ohio
	Fraser Companies, Ltd.	Edmunston	New Brunswick
	Kimberly-Clark Corp.	Niagara	Wisconsin
	Kimberly-Clark Corp.	Badger-Globe	Neenah, Wis.
	St. Croix Paper Co.	Woodland	Maine
GROUP C	Escanaba Paper Co.	Escanaba	Michigan
	Bryant Paper Co.	Paper Div.	Kalamazoo, Mich.
	Bird & Son, Inc.	Norwood	Massachusetts
	Crystal Tissue Co.	Middletown	Ohio
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	Ft. Frances Pulp & Paper Co.	Fort Frances	Ontario, Can.
	Strathmore Paper Co.	Woronoco	Massachusetts
	Bemis Bro. Bag Co.	Peoria	Illinois
	Gardner-Richardson Co.	No. 1	Middletown, Ohio
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	Southern Extract Co.	Chillicothe	Ohio
GROUP D	River Side Paper Corp.	Appleton	Wisconsin
	International Paper Co.	Webster	Orono, Me.
	Hollingsworth & Whitney Co.	Aroostock & Cobbassee	Gardiner, Me.
	Union Company	Lockport	New York
	Gardner-Richardson Co.	No. 2	Middletown, Ohio
	Continental Paper & Bag Corp.	Ashland	New Hampshire
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	Bird & Son, Inc.	Chicago Roofing Plant	Chicago
	International Paper Co.	Livermore Falls	Maine
	International Paper Co.	Riley	Maine
	Hollingsworth & Whitney Co.	Abenaquis Mill	Madison, Me.
	Spaulding Fibre Co., Inc.	No. 1	Milton, N. H.
	Spaulding Fibre Co., Inc.	Hayes	Rochester, N. H.

Division II—Remanufacturing

	Champion Coated Paper Co.	Coating Mill	Hamilton, Ohio
	Bryant Paper Corp.	Imperial Div.	Kalamazoo, Mich.
	Oxford Paper Co.	Maine Coated Div.	Rumford, Me.
	Gardner-Richardson Co.	No. 4	Middletown, Ohio
	Individual Drinking Cup Co., Inc.	Easton	Pa.
	Consolidated Water Power & Paper Co.	Stevens Point	Wisconsin
	Kimberly-Clark Corp.	Atlas	Appleton, Wis.
	Texas Corrugated Box Co.	Dallas	Texas
	Southern Container Co.	Houston	Texas
	Bemis Bro. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES—Division I

	Key	Rank	Points Credit	Points Debit
GROUP A	PA-11	5	854.354	
	PA- 8	6	739.664	
	PA- 4	7	720.806	
	PB- 9	8	687.378	
	PA- 3	9	579.088	
	PA- 5	10	538.056	
	PA- 1	11	527.330	
	PA-12	12	475.080	
	PB-15	13	371.598	
	PB- 8	14	179.954	
	PA- 9	15		69.984
	PA-13	16		436.750
	PA- 7	17		962.580
	PB- 2	18		1,042.906
GROUP B	PC-10	6	561.990	
	PB-13	7	460.136	
	PB- 3	8	232.592	
	PC- 7	9	217.714	
	PB- 1	10	189.806	
	PC- 8	11		31.606
	PB- 4	12		461.474
	PC-18	13		576.666
GROUP C	PB-10	12	267.648	
	PC- 3	13	220.904	
	PC-14	14	132.264	
	PD-28	15	112.918	
	PD- 2	16	13.114	
	PC-19	17		377.070
	PD-25	18		421.068
	PC-12	19		617.672
	PC-13	20		851.890
	PC- 2	21		905.394
	PD- 1	22		966.936
	PC- 4	23		2,270.170
Group D	PD-26	14		871.014
	PD-14	15		940.344
	PD- 7	16		2,191.498
	PD- 8	17		3,009.202

Division II

RD- 6	11	934.378

No July Report: PB-14, PC-17, 22, 23; PD-11, 12, 21, 22, 23; RC-3.

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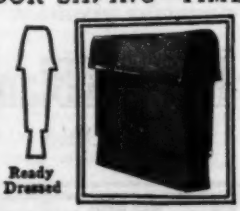

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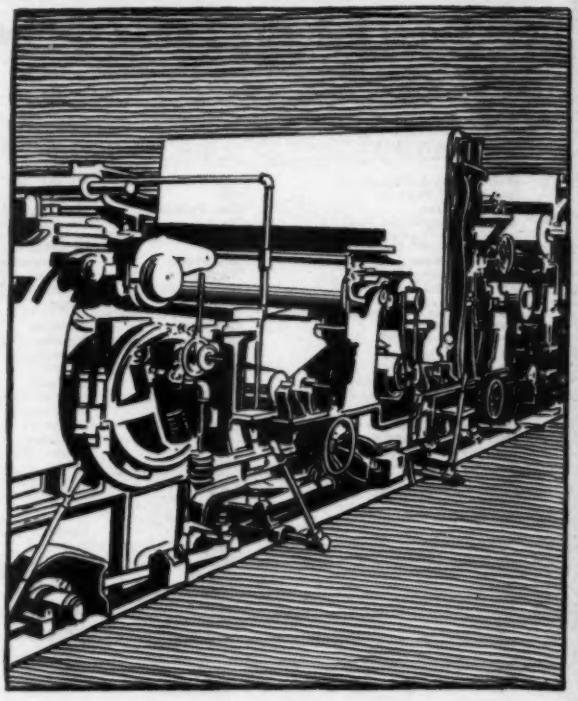

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TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY ■ DOMESTIC AND FOREIGN

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Defibrinating Paper in Laboratory

In making various tests on pulp in sheet form and also on paper in the laboratory for the purpose of determining bleachability, copper number and the like, it becomes necessary to have available a rapid and efficient means of disintegrating the paper or pulp into fibers. It is claimed that the various special apparatus that are used for this purpose are costly, take too much time and require too much space in the laboratory. Furthermore, disintegrating the samples of pulp and paper by hand is very tiresome and laborious. A much simpler and more effective method is to use an ordinary cream beater of the type consisting of a cylindrical vessel, in which round, perforated discs fastened to a stem moved up and down by hand. The action is one of rapid and intensive swirling. Tests have shown that bleached and unbleached sulphite, soda and straw pulps in sheet form are completely beaten up within one to two minutes perfectly free from lumps. Evenly sized paper is completely defibrinated within five to eight minutes and printed newsprint after short preliminary treatment with hot water within three to five minutes.

The pulp is first impregnated with water and torn up into pieces about half to one square centimeter in size and then mixed with water to give a half to one per cent mixture and brought into the apparatus. It is advantageous to stop the operation once during the process and to remove the particles that stick to the cover of the vessel as well as the walls. The beater is then replaced and beating is continued. E. Koeppe. Wochenblatt fuer Papierfabrikation, 1933, volume 64, page 102.

◆ Hemicellulose From Wood Waste

The waste wood was chopped or crushed. The incrustating materials were removed by heating with dilute alkali at a temperature of 94 to 100 deg. C. The wood was then converted into pulp and the latter bleached with hypochlorite solution at room temperature. Unstripped sprucewood, cut into 60 mm. sections, was heated at a temperature of 95 to 97 deg. C. for four hours in a solution which contained 2.5 per cent. of sodium hydroxide. The suspension of wood and alkali lye was ground in a suitable apparatus to remove the bark. The latter was separated and the hemicellulose suspension was then reground and screened. Stripped spruce wood, heated for eight hours with 2.5 per cent. sodium hydroxide and ground for six hours, gave 72 per cent. of the total pulp as hemicellulose. On the other hand, unstripped wood gave 68 per cent. Total pulp yield obtained from unstripped spruce on heating with 2.5 per cent. sodium hydroxide was 85.79 and 76.5 per cent. for six, eight and ten hours respectively. Heating for eight hours with 2.5 per cent. sodium hydroxide containing fifteen per cent sodium sulphide gave 85 per cent. pulp. O. Routala and J. O. Murto. Pappers-Traevarutid Finland, 1933, pages 20 to 22.

◆ Soda Liquor Recovery

The Wagner process for the recovery of waste liquor from the soda process is described. A liquor concentration of 35 deg. Be. at approximately 100 to 110 deg. C. is required for the Wagner furnace, the waste liquor being concentrated in a special evaporator. Figure 1

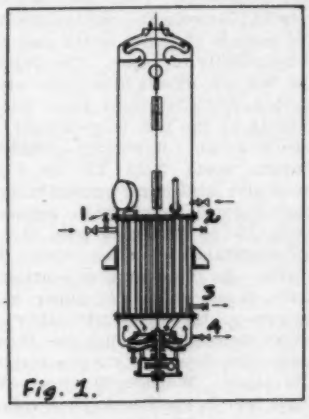


Fig. 1.

shows the evaporator. Steam enters at (1) and liquor at (2), while the liquor in concentrated form is removed at (4) and the condensate from the steam coils at (3). The feature of the evaporator is a special circulating device, the propeller of a centrifugal pump, arranged below the evaporation chamber and affording rapid and effective circulation of the liquor inducing greater concentration. Details of the operation of the evaporator are given in the original article. Figure 2 shows the arrangement of the battery evaporators. The dilute liquor pump is indicated at (1), the liquor then passing through a filter (2). Various circulatory pumps are shown at (3). Steam enters from the line (4). The vapors from the last evaporator in the battery pass through the water separator (5) and are sucked through the line (8) by a vacuum pump to the Wagner furnace. The concentrated liquor is removed to the Wagner furnace through the outlet (9). A hot water tank is shown at (4¹), a condensate collecting pit at (6) from which uncondensed gases are removed through the outlet (7) to towers for destroying

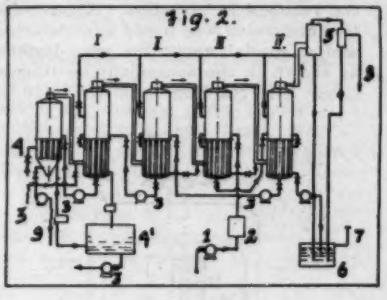


Fig. 2.

the odor of the escaping gases. Perfect utilization of heat is claimed for this evaporator installation. The Wagner furnace installation itself is shown in Figure 3. The furnace itself is shown at (1). The concentrated waste liquor enters through the line (2) and the molten product is collected in the tank (9) from which it is removed to the causticizing installation through the line (10). The waste heat boiler is shown at (3) and (3¹) is a steam outlet. The salt container is shown at (5), the compressor at (8), the foul gas inlet pipe at (6) and the air inlet line at (7). Compressed air blower is shown at (4). The suction line is shown at (11) for the combustion gases from the Wagner

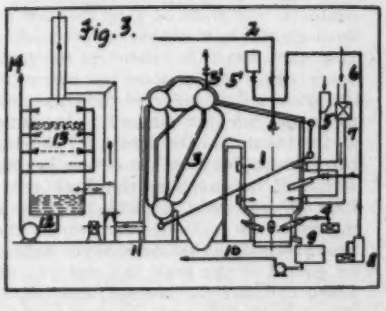
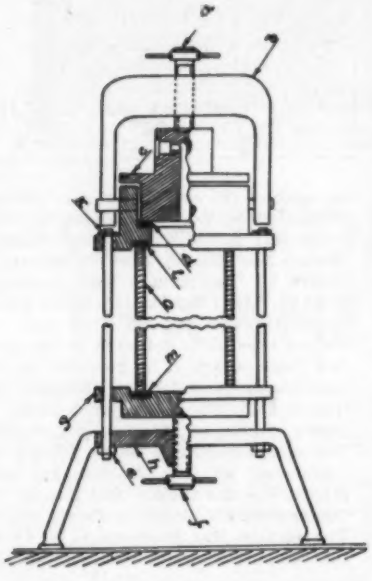


Fig. 3.

furnace which are obtained by burning oil which is fed from the tank (5¹). The suction gases then pass through the washer (13), the wash liquor being circulated by the pump (12). The washed gases finally leave through the outlet (14), going to the concentrating installation. Details of the operation of this apparatus are given in the original article. Dr. Hubert Kienzl. Der Papier-Fabrikant, volume 31, 1933, pages 130 to 134.

◆ Changes in Wood in Sulphite Digestion

A method is described for observing the action of sulphite digestion on the cell membranes in wood. Microphotographic examination of beechwood and pinewood samples were made at various stages of the digestion to determine the morphological changes. The heating of the wood in the experimental digester afforded considerable difficulty, due to the fact that the original concentration of the digestion liquor, pressure and temperature had to be kept as constant as possible. The digestion was carried out in pressure bottles with rubber washer packings, the rubber washer being renewed in each test. Nevertheless this apparatus was found unsatisfactory and a special apparatus was designed as shown in the accompanying illustration. The reaction flask (o), 750 cc.



contents, was made of pressure-resistant Jena glass. It is placed on the packing ring (m) which is located in the lower cover (g). By turning the screw (f) the presure flask is forced tightly against the upper packing ring (l). Inasmuch as the turning of the screw (f) shortens the distance between the covers (g) and (h), and inasmuch as the flask (o) is kept in an exact central position by means of ten metallic rods, whose ends are threaded and fastened to the support by means of the nuts (k) and (e), the glass cylinder is pressed and tightly closed uniformly and simultaneously in all directions. After this has been done, the packing ring (d) is placed in position to secure a tight joint for the upper cover (c). The turning of the central screw (a) ensures the tight contact of the cover (c) against the packing ring (d). Great care had to be taken in selecting the material of the packing rings. Special asbestos rings were used. Pressure within the apparatus was measured by means of a manometer. The apparatus was also provided with inlet and outlet connections and accessories. The apparatus is heated in a bath by means of a Bunsen burner. Continuous tests were made in this apparatus at temperatures up to 170 deg. C. and at pressures up to seven atmospheres as a maximum. The theoretically expected pressure of 5.3 kilograms per square centimeter was reached at 145 deg. C. The heating liquid was a clear, light yellow, thinly viscous oil, free from acid, with a flame temperature of 185 degrees C. Dr. O. Gerngross and Dr. Kurt M. Hoffmann. Der Papier-Fabrikant, 1933, volume 31, pages 127 to 130.

◆ Air-Penetrability of Paper

The ease with which air penetrates paper is an important quality of the latter when used for certain industrial purposes, such as making bags, cables, transformers, etc. Air-penetrability, according to the Schopper test, is read off a measuring cylinder, giving the number of cubic centimeters of water collected in a unit of time, namely one minute, with a vacuum of 10 cm. of water and a testing surface of 10 sq. cm. The quantity of water corresponds to the quantity of air, which passes through the paper during the experiment. Tests were made on pure soda pulp paper to determine various relations between the air-penetrability of paper and operating conditions in the testing process. Thus there is a definite relation between the suction pressure on the sample of paper tested and the air-penetrability of paper. The duration of the test also affects this factor, since the air-penetrability drops from minute to minute as the test is prolonged. Moisture is another important consideration. Papers made from 23- to 72-degree pulp give higher air-penetrability when they become moist, while papers made from 75- to 94-degree pulp give lower air-penetrability when they become moist. As the degree of beating of the pulp, from which the paper is made, increases, the air-penetrability of the paper decreases. Hence the slower the pulp, the less the air-penetrability of the paper. Walther Stoewer. Wochenblatt fuer Papierfabrikation, volume 64, pages 57 to 59, 1933.

◆ Halfstuff From Straw

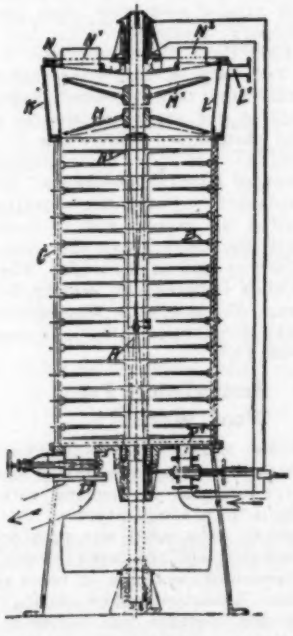
A weakly alkaline digestion liquor is used in the new process. The alkaline digestion of the raw material is carried out with reduction of the concentration of caustic lime and other alkali in the liquor. The partial digestion of the raw material at an elevated temperature is effected in such a manner, that the digestion liquor towards the end of the reaction shows a weakly acid reaction, which is caused by the splitting-off of organic acids from the fibrous mass. This new method of digestion which begins with the use of a weakly alkaline liquor and ends with the recovery of a weakly acid waste liquor, softens the fibrous mass particularly effectively, partially dissolves the intercellular, incrustrating substances and loosens the fiber bundles so that a product of maximum strength is obtained. Willi Schacht, Weimar, Germany. German Patent No. 563,440.

◆ Sizing Paper

A new method has been developed for sizing paper with mineral and vegetable waxes and resins, such as lignite wax, carnauba wax, also paraffin and mixtures of these substances, so that they are used in a properly emulsified state with avoidance of flocculation. For example, 50 grams of carnauba wax (acid number 2), 6.5 grams of the polyglycerinic ester of cocinic acid and 30 cc. of water are melted while being agitated and then 20 cc. of a 2-normal solution of potassium hydroxide are added. A perfectly uniform emulsion is obtained, which can be diluted as desired with soft water or with hard water. The sizing mixture can be easily precipitated by alkali-earth and heavy metal salts. The sizing mixture is added to the pulp in the beater in the proportion of one to 50 calculated on the weight of the carnauba wax and the dry weight of the paper. Precipitation of the size is accomplished in the usual manner on the paper fibers with the aid of aluminum sulphate or the like. Other examples are given, indicating the use of paraffin, lignite wax, stearic acid and beeswax. French Patent No. 738,991. I. G. Farbenindustrie A. G.

◆ Making Half-Stuff

The apparatus, in which the process is carried out, consists of a cylindrical vessel (C) which is provided with a vertical shaft (A) to which are fastened

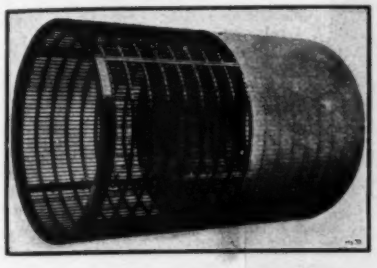


the disintegrating members (A^1). These are arranged horizontally. They are sword-shaped, and extend almost to the shell of the apparatus. Stationary disintegrating members (B) are fastened to the inner wall and these are likewise

sword-shaped. They extend between the revolving sword-shaped members (A_1) almost to the shaft (A). The propellers (M) and (M_1) are located in the upper part of the shell (C). These propellers move the stock. Carl Leyst-Kuechenmeister, Berlin-Schlachtensee, Germany. German Patent No. 562,770, filed November 24, 1928.

◆ Dehydrating Cylinder

A new form of apparatus is shown wherein the construction of the surface of the cylinder is such that there are no dead areas. There is no underlying fabric covering for the cylinder with



the result that the usual clogging up of the mesh is avoided and there is a freer passage for the water into the interior of the cylinder. In the case of cardboard and pasteboard machines, a covering is provided made of phosphor bronze wire fabric. Martin Buettner. Wochenblatt fuer Papierfabrikation, 1933, volume 64, pages 121 to 122.

◆ Making Pulp With Alkaline Liquor

The process is chiefly concerned with the production of pulp from beechwood. Boiling alkali liquor is used under pressure. The liquor is heated in a tank, which is located above the digester, to a temperature of approximately 200 deg. C. Only after the liquor has reached this temperature is it brought into contact with the wood chips. Hence the digester itself is not heated and it is claimed that large losses of heat as well as changes in the concentration of the digestion liquor are avoided. Fagocelulosa G.m.b.H., Prag-Smichow, Czechoslovakia. Czechoslovakian Patent No. 40,962.

◆ Making Easy Bleaching Pulp

Soda and sulphate pulp is subjected to successive washings with very dilute alkaline liquors, etc., for the purpose of making them easy-bleaching. The process also involves treatment with a hot solution of alkaline earth bases and chlorinated water, or soluble chloride and an acid treatment. After the residual lye has been removed from the pulp and after it has been washed in the regular manner, it is subjected to a second washing with a very weak alkaline liquor, containing a maximum of one per cent sodium hydroxide or sodium hydroxide plus sodium carbonate. Washing takes place at a temperature of approximately 80 to 90 deg. C. In certain cases the temperature may be allowed to rise to 110 deg. C., while operating under a pressure of about one kilogram per square centimeter. After the liquor has been removed, which liquor can then be reused twice or three times, the pulp mass is rinsed at first with ordinary water and then a third washing is done with a hot solution of an alkaline earth base and chlorinated water or soluble chlorides, for example, approximately 0.4 per cent of lime and 0.4 per cent of sodium chloride. The liquor is circulated during the aforementioned washing processes. After the solution used for the third washing has been removed, the pulp is subjected to the ordinary treatment that is carried out on pulps up to the point where it reaches the beaters. If the pulp has been thoroughly cooked, the second washing may be eliminated, that is, the washing with alkaline liquor. In this case the third washing is prolonged, that is, the washing with a solution of an alkaline earth base and salt. When the pulp comes into the beater, it is treated with a weak solution of sulphuric acid, about three kilograms of sulphuric acid calculated per 100 kilograms of pulp. When the color of the pulp becomes homogeneous, a solution of sodium chloride is added, about two to three kilograms per 100 kilograms of the dry pulp. After this treatment, which lasts for half to one hour, the pulp is washed with ordinary water. The pulp is then ready for bleaching by the usual process. The sulphuric acid treatment removes the lime residues and at the same time a large part of the residual hemicellulose dissolves in the acid and is removed. Soda pulp and sulphate pulp treated in this manner bleaches as readily as sulphite pulp. French Patent No. 742,062. Gotthard Rosen.

◆ Paper Sizing Problems

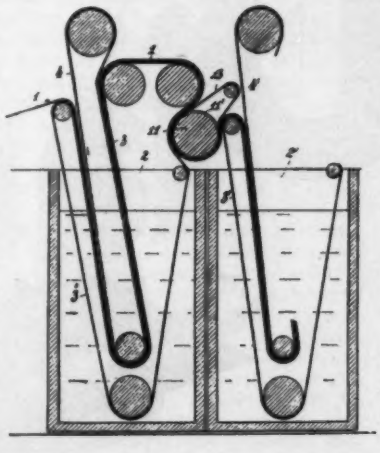
The Wieger theory of optimum size of particles is shown to be generally untenable. The particles of rosin must not be too great and not too small, and the size of particles as well as the content of free rosin in the rosin soap must be adjusted in accordance with local conditions. Sizing depends from the mechanical-physical standpoint on the combination of formation of flakes in the soap and electrical precipitation of the particles of free rosin. According to the electrical ionization theory of Arrhenius, the solution of sodium resinate is already split into ions and hence rosin is present in ionic form. It is claimed that Wieger also overlooks the importance of hydrolytic splitting as far as the ash content problem is concerned. The author emphasizes the following points which require scientific investigation—the free rosin theory in its relation to all types of sizing processes from zero to 100 per cent free rosin; the size of the particles of free rosin as an essential matter in the effectiveness of the size; the limits of free rosin content and its relation to the economy of a rosin size; and protective colloids and their action. F. Arledter. Der Papierfabrikant, volume 45, pages 641 to 643.

◆ Coating Paper

A coating preparation, which is used for the production of a brilliant surface particularly on paper or pasteboard, contains nitrocellulose of low or high viscosity, special plasticizers composed of esters of the aliphatic or aromatic series, gums, heavy solvents, higher alcohols and diluents, such as benzene or toluene. An example contains sixteen parts of nitrocellulose, twenty parts of ethyl acetate, 7.5 parts of butyl acetate, 7.5 parts of butyl lactate, fifteen parts of octyl phthalate, ten parts of ethyl alcohol, four parts of gum dammar, 3.5 parts of albertol, 2.5 parts of ester gum and fourteen parts of toluene. Compagnie des Vernis Valentine. French Patent No. 740,212, filed October 17, 1931.

◆ Washing Parchmentized Paper

The apparatus, shown in the illustration, is for washing paper treated with parchmentizing liquors. Each bath (2) and (2^1) is provided with a separate pair of belts (3) and (4), and (3^1) and (4^1). A carry-over roll (11) is arranged so that it is common to both belts. This roll processes greater adhesion for the paper web (1) than the



belts (3) and (3^1). This roll also has a groove cut out in it, as shown at (11^1) which is used for guiding the belt (13). The purpose of this belt is to loosen the paper web (1) from the roll (11) and convey the same to the belt (3^1). Heinrich Nicolaus & Co., G.m.b.H., Kempten, Allgaeu, Germany. Ger. Pat. No. 567,410, filed May 9, 1931.

◆ Continuous Pulp Process

The raw material is fed continuously through a battery of digesters, which are arranged in series and which are provided with transporting devices. The battery is provided with arrangements for continuous automatic regulation of the feed of raw material and chemicals as well as for the regulation of the level of the digestion liquor and the removal of the treated pulp as well as the chemicals, and where necessary of the waste liquor as well. W. W. Triggs, London, England. British Patent No. 372,425, filed February 14, 1931.

WHETHER YOU USE Soda Ash, Caustic Soda, Liquid Chlorine or Bicarbonate of Soda—there's a good deal of satisfaction in knowing that when you specify DIAMOND BRAND you are getting full strength, full value and the highest possible commercial purity that modern manufacturing methods can produce. Consistently uniform quality is the ideal of the entire Diamond organization at all times.

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The COMMERCIAL OUTLOOK

New York, Sept. 1, 1933.

THE outstanding feature in the paper market situation is the steady, almost uninterrupted, rise in prices. The advance embraces every class of paper and board; the uptrend in values is general in nature, yet is being brought about by action of a more or less individual character insofar as concerns the different units of paper manufacturers; in short, under the new set-up of the National Recovery Act paper manufacturers are working jointly in groups—and it might be said in real harmony—in readjusting prices of their product to conform with increased production costs under the terms of their industrial code of fair competition.

The advance in market price levels, in comparison with those prevailing only a few months ago, is nothing less than surprising. Repeated rises have been put into effect almost weekly, for a period of weeks in most classes of paper, and the end does not seem to be yet in sight. However, the quotational increases are not a bit out of proportion to the higher manufacturing costs brought about by the shortening of working hours and raising of wages of paper mill labor under the terms of the code. Paper manufacturers are co-operating today to a degree never before known within the industry; there are groups of mill owners or executives who are closely allied in formulating and adopting codification who never before have worked together, and who, it might be said, themselves believed and were believed by others in the industry could not get together for co-operative action. The result is that a system of price control is being set up such as has never been known in the industry, and prices are being gradually though nevertheless reasonably adjusted in like proportion to the drastic changes taking place within the industry, particularly relating to the cost of producing paper and board.

Illustrative of what is happening within the paper manufacturing industry, the president of one of the largest papermaking companies—if not the largest—in the country, in rendering the financial report of his organization for the first six months of this year, made the statement that preliminary figures indicate the company realized a manufacturing profit in the month of July, this in spite of the fact that the company in question has shown heavy financial losses consistently for the past few years. The explanation back of this change in the financial picture is that paper manufacturers not only are producing and marketing a much larger tonnage of paper currently than in several years at least but also are securing prices in sales enabling them to show a profit over and above manufacturing costs—something which the average paper producing company has not been blessed with for a long time.

From a demand standpoint, the market has quieted to some extent during the last month. In a sense, paper manufacturers themselves have been to blame for the contraction in business. So rigidly are the regulations covering forward purchases being enforced that consumers, converters and jobbers have been discouraged in buying. Thus, demand has been cut down as contrasted with the volume of purchasing witnessed up to a few weeks ago. Moreover, the season, as well as influential circumstances outside the paper industry, have served to curtail buyers' operations, this being the period of the year when ordinarily consumption is low and demand is slowed up thereby, while the various consuming trades have been so busily engrossed in compiling and adopting their respective codes and otherwise putting their own houses in order under the terms of the New Deal that they have let down in the absorption of material supplies.

Nevertheless, activity in the market is on a broad scale, and the paper and board mills of the country have more business booked than in a long while; demand is ample to keep nearly all mills operating at a good rate of capacity. The outlook for continued satisfactory demand is regarded in practically all quarters of the industry as most favorable. The Government's program is putting people back to work, is raising wages, and is increasing the buying power of the nation. This, of course, is the prime objective of the codification of industry and the recruiting of the public in support of the national effort to improve business. The feeling is general that the manner in which the country is responding to the Roosevelt Administration's big push for industrial and trade improvement spells success for the program. From now on it is expected the true effects of the NRA will be seen in the consuming fields; that the demand for commodities and products of every sort will show a steady increase; that manufacturing establishments will be called upon to speed up their production, and that business in general will expand until the prosperous days of the 1929 period and other eras of trade activity return.

Obviously, paper manufacturers expect to share fully in this anticipated business revival. Paper, being an article consumed in so many and varied directions, all that is needed to bring prosperity back to the paper industry is general business improvement. There are those within the industry who look for the coming winter to be one of the busiest periods the paper industry has ever experienced; others, taking a more reserved view, expect the excellent business of the last few months to continue, if not to be improved upon.

Production of newsprint in the United States in July amounted to 79,482 net tons, compared with 84,384 tons in the preceding month, while shipments from mills were 82,068 tons, against 87,359 tons in June, according to the News Print Service Bureau. Production in Canada in July was 180,387 tons, contrasted with 171,419 tons in the month before, and shipments totaled 181,658 tons, against 171,678 tons in June. During July, 21,178 tons of newsprint were manufactured in Newfoundland and 1,289 tons in Mexico, so that the total North American production for the month reached 282,336 tons, compared with 277,871 tons in June. The Canadian mills produced 66,047 tons less in the first seven months of 1933 than in the similar period of 1932, which was a decrease of 6 per cent. The output in the United States was 82,985 tons or 13 per cent less than in the same time a year ago, in Newfoundland 19,512 tons or 12 per cent less, and in Mexico 2,013 tons more, making a total North American decrease of 166,531 tons or 9 per cent. Stocks of newsprint at United States mills at the end of July amounted to 19,378 tons, and at Canadian mills 41,963 tons, making a combined total of 61,341 tons, compared with 65,198 tons at the end of June last. The July production of newsprint in the United States and Canada showed a 19.7 per cent rise over the corresponding month of 1932, constituting a sharp upturn in the industry. Canadian output was 26.6 per cent over that a year ago, while production of United States mills gained 6.6 per cent over July, 1932.

The July wholesale price index number for paper and pulp, as compiled by the Bureau of Labor Statistics of the U. S. Department of Labor, was 78.1, compared with 73.5 for the preceding month and 76.2 for July of last year, taking 1926 as 100.

❖ ❖ ❖

◆ Manhattan Rubber Opens Plant in Neenah

A completely equipped factory for the manufacture of rubber rolls has been opened for operation at Neenah, Wis., by the Manhattan Rubber Mfg. Div., Passaic, New Jersey.

Condor rubber rolls of all sizes made by this company can now be furnished to mills in the Fox River Valley and adjacent territory at more advantageous prices and with greater dispatch. Inquiries should be addressed to the Neenah office or the company's sales office, 122 S. Michigan Ave., Chicago.

Domestic RAW MATERIALS

◆ Papermaking Rags

Not a great deal of additional change has occurred in prices of papermaking raw materials during the past month. Following the period of active buying on the part of manufacturers and sharp upturn in market values of practically every item of raw stock entering the paper mill, developments in recent weeks—more particularly the putting into effect the provisions of the industrial codes as relating to working hours and wages—has tended to slow up buying, and the upward surge of prices has been checked. However, only in exceptional instances have recessions been registered.

Demand for papermaking rags has tapered off to a decided degree. Writing paper, blotting, cover and other paper mills, and also roofing felt mills, have let down in their buying to an extent where the market can now aptly be described as dull. Indications are that most consumers have not alone covered their anticipated requirements for a time but in numerous cases have piled up some surplus stock, and little disposition is evinced currently to add to commitments pending the development of more concrete needs. The falling off of demand from mills has led to a slight easing in certain kinds of rags, though as a general thing prices are holding steady on the levels reached during the advancing movement of the market some time ago.

There is small doubt, or no doubt at all, that the higher market prices brought out a good many more rags, as well as stimulating collections to a point where supplies for some while to come promise to bulk larger. Nevertheless, the supply condition is not altogether in favor of paper manufacturers—not by any means. One cardinal reason for the slowing down of demand in recent weeks and for the halt in the price advance was that large quantities of rags of some grades were imported from Europe and elsewhere to appreciably increase the available supply in this country and thereby enable paper and felt mills to acquire the stocks desired. These larger importations constituted accumulations which packers abroad happened to have as a result of the long stretch of market dullness, and importers and dealers emphasize that the increased imports could not be duplicated, even at higher prices, or not until packers have been afforded ample time to again accumulate stocks. Moreover, the domestic sources of supply have been raked and combed for rags during the last several months, and the supply situation at collection sources is bullish unmistakably.

New York dealers are quoting No. 1 new white shirt cuttings at 7 cents per pound f.o.b. that city, new light silesias at 4.75 cents, unbleached muslins at 7.25 to 7.50 cents, fancy shirt cuttings at 2.75 cents, blue overall cuttings at 4.50 cents, washables at 2.25 cents, and bleached canton flannels at 6.25 cents. Old white cottons are around 3 cents for No. 1 repacked quality, and 2 cents for No. 2 repacked while twos and blues of repacked grade are quoted at 1.60 cents at dealers' shipping points, and thirds and blues at 1.40 cents.

◆ Old Paper

While the old paper market is possessed of a firm undertone and prices are well maintained, instances have cropped up in the past few days of slight reductions in prices on certain grades. Board manufacturers are making a drive for lower costs of old mixed paper and newspapers, and they have succeeded in some cases in purchasing mixed paper at recessions of $1 and $2 per ton from the top levels reached by the market. Shavings remain very firm in price, as do book stock, ledgers and old kraft and corrugated descriptions. The New York market continues to set the pace in establishing waste paper prices, and old No. 1 mixed paper is bringing 75 to 85 cents per hundred pounds f.o.b. that city, folded news 90 to 95 cents, heavy books and magazines 1.15 cents a pound, crumpled book stock $1 a hundred pounds, white ledger stock 1.30 cents per pound, colored ledgers 1.15 to 1.20 cents, overissue newspapers 1.05 cents, old No. 1 kraft paper 1.20 to 1.25 cents, old corrugated boxes 95 cents to $1 a hundred pounds, and kraft corrugated cuttings 1.30 cents. Shavings have sold in the East at 2.40 cents a pound f.o.b. New York for No. 1 hard white, 2.25 cents for No. 1 soft white, 2.50 cents for one-cut soft white shavings, and 2.75 cents for No. 1 hard white envelope cuttings.

◆ Pulpwood

The peeling season for pulpwood is now over, and a good crop has been harvested. The outlook is regarded as considerably brighter than in some time, and prices for wood tend to stiffen. Indications are many pulp and paper mills will be in the market for supplies as their wood piles are diminishing.

◆ Rope and Bagging

The prices quoted by the leading paper mill buying agency on old rope continue to be 2.50 cents a pound at dealers' shipping points for No. 1 domestic old manila, and 2.25 cents ex dock U. S. Atlantic ports for No. 1 foreign old manila rope. So-called independent consuming mills are reported paying in excess of these levels in some instances. However, the market has quieted perceptibly, and matters are shaping up more in favor of buyers. Old bagging is in routine demand principally, and prices are hanging to last levels with consumers probably effecting some purchases slightly cheaper. No. 1 scrap is about 1.15 cents a pound at dealers' shipping points, old gunny bagging around 1.30 cents, and roofing bagging 70 cents per hundred pounds or thereabouts.

◆ Mechanical Pulp

Mechanical pulp is in a stronger technical market position, as a result of limited available supply, and prices are firm to an extreme. Canadian and domestic groundwood is selling readily at $27.50 per ton ex dock at Great Lakes ports, which means consumers are granting up around $33 to $34 a ton delivered their mills. Grinders across the Canadian border who only a few months ago were accepting $14 and $15 a ton f.o.b. producing mills for groundwood are now securing $23 and $24 on the same basis, and many have proceeded to sell out their production for a time at the higher prices. Groundwood on the Atlantic seaboard is quoted at $25 a ton and higher ex dock. Demand is quite active, and virtually all the supply offered from any quarter is quickly taken up by consuming buyers.

◆ Chemical Pulp

The chemical pulp market is still very much in sellers' favor. There is surprising little tonnage available in the market; domestic pulp mills are well sold up for a considerable period, so much so that a majority are averse to booking further orders and actually are doing what they can to turn consuming customers away. Instances have been cited lately where manufacturers have purposely named advanced prices—and stiff advances—to discourage buyers seeking pulp from them. It is asserted that for the first time in years pulp mills on the Pacific Coast and in other sections of the country are sold up for some months ahead, and are plainly reluctant to accept additional orders at this time for future shipments. Prices are very firm and exhibit a strong rising tendency. Domestic prime bleached sulphite is scarcely to be had under 3 cents a pound ex dock Atlantic seaboard; certainly at no lower than 2.75 cents, and some mill brands are quoted far in excess of 3 cents. Bleached soda pulp is 2.50 cents delivered book paper mills; unbleached sulphite is firm on a range of 1.75 to 2 cents at pulp plants, and kraft pulp is 1.90 or 2 cents for No. 1 eastern and around 1.70 cents for southern kraft.

◆ Chemicals

Prices of casein have stiffened to 15.50 cents a pound for the finely grond domestic product and 14.75 cents for the cheaper quality. Imported casein is quoted at 14 to 15 cents, depending on quality, duty paid. Caustic soda and soda ash are moving freely on contracts, and at steadily maintained prices. Bleaching powder demand is fairly active, and quotations are firm at 1.75 to 2 cents per pound at works.

Import and Export MARKETS

IMPORTS

◆ Wood Pulp

A steady stiffening of prices of imported wood pulp has been noted during the last month. Not only have prices gradually climbed to where appreciable further advances have been registered, but the supply situation has consistently tightened until it now presents much difficulty to those on the buying side, as well as the selling end, of the market.

Basically, the position of imported chemical wood pulp is simply world demand has made such strides forward during the last few months that available supply is insufficient to care for consumers' wants, more particularly as pulp mills in Europe are operating under group agreements restricting their production. Most pulp manufacturers in Scandinavia, Finland and other pulp-producing countries of Europe actually have reached a point where they have no more tonnage to sell for the balance of this year, and, in view of the wide possibilities of the future market, are in no mood to accept contracts for their product farther ahead. It can be said that this is the position of just about all the European pulp mills, with perhaps a few straggling exceptions. Under these circumstances—and it is believed that the situation has not been exaggerated—it is not a bit surprising that market prices should exhibit all the strength they do at present, and that consuming buyers in the market seeking supplies are encountering distinct trouble getting the pulp desired, even though they are satisfied to grant full market prices, or higher.

There is every indication that substantially more business could be readily transacted were the pulp wanted by paper and board manufacturers in the United States to be had. Offerings from primary sources abroad have diminished to a bare minimum; instances are cited day by day by importers and agents where they cable over asking for offerings or quotations and receive nothing in return except the polite refusal of any further business, either for the remainder of this year or during 1934. European pulp producers apparently are adopting the view that, with everything in their favor of higher prices for next year, it behooves them to hold off effecting further sales until some of the market developments which are expected come to pass. Fortunately, a majority of American consumers have covered their requirements fairly fully for the balance of the current year, and there is no actual shortage of pulp insofar as present needs are concerned, but numerous paper manufacturers stand ready and willing to add to their purchasing commitments and are finding it difficult indeed to get the pulp desired.

Foreign bleached sulphite has attained a price stage where 2.75 cents per pound represents about the bottom level at which prime pulp of this classification is obtainable. In fact, this price is low, as most of the few quotations now being made are up around 3 cents ex dock New York and other American Atlantic ports. Prime strong unbleached sulphite has sold at 2 cents, and probably higher, per pound on an ex dock Atlantic seaboard basis, and some mill brands are quoted above this price. Kraft pulp is particularly hard to buy. The nominal market price level on prime Scandinavian kraft is 1.80 or 1.85 cents a pound ex dock, but very little or no kraft is to be had at this basis, and nominal prices range well above this.

Reflecting the upturn in the pulp market, importations of chemical wood pulp into the United States in June showed a big increase compared with the preceding month, reaching a total of 122,518 long tons of all grades of chemical pulp, valued at $4,020,995, contrasted with 73,376 tons of a declared value of $2,571,535 in May, and 64,011 tons of a value of $2,433,032 in June, 1932, according to U. S. Department of Commerce figures. The June imports brought the total for the first half of this year up to 533,169 long tons, valued at $18,546,043, against 600,187 tons of a value of $23,438,867 in the same period a year ago. Groundwood imports in June last were 16,682 long tons, valued at $270,592, against 16,146 tons of a value of $253,590 in the preceding month, and for the first six months of the current year totaled 60,343 tons of a value of $1,009,082.

◆ Paper Stock

Imports of rags for papermaking into the United States registered a sharp gain in June last, amounting to 16,284,059 pounds and valued at $126,687, compared with 6,008,327 pounds of a declared value $30,756 in the month before, according to U. S. Department of Commerce statistics. Imports during the first six months of this year aggregated 39,937,435 pounds, valued at $295,266, compared with 45,458,873 pounds of a value of $596,950 in the similar time last year. Miscellaneous paper stock imports in June amounted to 9,371,660 pounds, valued at $92,081, against 6,817,755 pounds of a value of $65,290 in the month before, and making a total for the first half of this year of 37,760,202 pounds of a value of $366,302, compared with 49,982,380 pounds of a value of $423,093 in the corresponding period of 1932.

◆ Paper

The value of paper imports into the United States during the month of June, 1933, amounting to $6,122,148, showed a decrease from the importations valued at $6,890,913 in the preceding month. Receipts during the first six months of this year reached a total value of $34,340,510, contrasted with imports of a value of $50,768,028 in the same time last year, and $66,095,703 in the first half of 1931. Standard newsprint, to the value of $5,466,966, was the principal item of import in June last, with cigarette paper to the value of $234,626 the next important class of paper imported.

EXPORTS

Exports of paper and paper products from the United States again recorded at least a slight increase, in point of total value, during the month of June last over the shipments in the month preceding. Department of Commerce statistics place the total exports in June, 1933, at a value of $1,132,546, against $1,102,063, and compared with $1,380,228 in June, 1932. The six months' exports this year aggregated in value $6,543,439, against $8,534,099 in the first half of 1932, and $12,125,865 in the same time of 1931.

Newsprint exports in June last amounted to 1,279,923 pounds of a value of $29,274, compared with 1,312,420 pounds of a value of $35,611 in the same month last year. Uncoated book paper exports were 2,257,701 pounds of a value of $99,765, contrasted with 2,217,982 pounds of a value of $114,341 last year in the same month. Wrapping paper shipments declined from a value of $106,817 in June, 1932, to $88,542 in June this year, whereas exports of writing paper climbed from $82,380 in June a year ago to $91,117 in June, 1933. Exports of tissue paper were valued at $40,280 in June last, against $47,592 in the similar month last year, and sheathing and building paper shipments were valued at $12,192, compared with $16,978 a year ago. Boxboard exports were valued at $69,263 in June this year, contrasted with $82,913 in June, 1932, while other paperboard exports were of a value of $50,740, against $89,079 in the same month a year ago. Exports of paper bags reached a value of $41,511 in June last, compared with $35,409 last year, and paper box exports were of a value of $38,619, against $50,512 in June, 1932.

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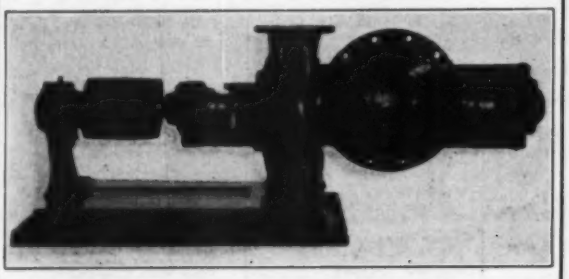

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